USDA PLANNING AID

THE ROLE OF AGRICULTURE AND FOREST LAND IN THE LONG ISLAND SOUND

A U S D A P L A N N I N G A I D

THE ROLE OF AGRICULTURE AND FOREST LAND IN THE LONG ISLAND SOUND AREA

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U. S. Department of Agriculture

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FOREWORD

The Long Island Sound Regional Study is a comprehensive study of land, water and related resources of Long Island Sound and portions of Connecticut and New York. It is a multi-disciplinary effort of state and federal agencies with the goal of outlining a program for the orderly land and water resource development in the area. A specific set of issues within this broader perspective deals with land use changes and improvements in the planning process. Many demands are being made upon the land, some conflicting, some complementary. Environmental and development concerns which on the surface often seem conflicting, need not always be so.

As cities grow, they often follow the path of least resistance, which means that level, well-drained areas are prime candidates for development. These same areas are generally the most productive agricultural areas and make significant contributions to the local economy.

In an expanding urbanized area such as the Long Island Sound region, land in cropland and forests is often classified as undeveloped and assumed to be available for other uses. It is the intent of this report to point out how the continuance of these land uses contributes to the area. Reasons for deferring urbanization of rural lands include preservation for crop and forestry production, wildlife habitat, environmental enhancement through landscape variety, erosion control, water storage, buffer zones, and recreation experiences. A fundamental reason for such deferred development is to keep one's options open, so that irrevocable land use decisions are not made without considering the implications.

This report is designed as a planning aid, and the guidelines that follow were prepared by the Economic Research Service, the Soil Conservation Service, and the Forest Service under the general chairmanship of the New England River Basins Commission. The authority for U. S. Department of Agriculture participation in the Long Island Sound Study is contained in Section 6, Public Law 566, 83rd. Congress, as amended.

SUMMARY

PURPOSE

This report provides information about agriculture and forest lands, streambelts, and upland erosion and sedimentation needs in the Long Island Sound Region. Further it recommends methods to identify these areas and steps needed to protect and manage those that are environmentally, economically, and socially important.

AGRICULTURE AND FORESTRY IN THE LIS REGION

Agriculture and forestry in the Long Island Sound Region plays a relatively small but vital role in the total economy. It is extremely important because it is a primary user of land. These lands are a significant component of the recreation and tourism industry.

There has been a continued shift in land use from agriculture and forest to urban uses. In Connecticut, between 1958 and 1967, urban land has increased 24 percent and in New York during the same period, there was a 74 percent increase. It is expected that the trend will continue into the 1990 and 2020 periods.

PROBLEMS RELATED TO AGRICULTURE AND FORESTRY

In too many cases, land has been considered as a commodity rather than managed as a resource. The consequences are serious impacts on the environment, increased runoff, soil erosion and sedimentation, damages to water quality, recreation opportunities, wildlife, and aesthetics.

Urban encroachment on these lands has caused economic concerns, higher taxes and land values, lack of farm labor, reduced production and efficiency.

Agriculture and forests can continue to have a potential value in the region if certain steps to protect the industry are taken.

METHODS USED TO IDENTIFY AND CLASSIFY CRITICAL AREAS

The identification and evaluation of agriculture and forest lands was made. The evaluation criteria are production, runoff, soil erosion and sedimentation, water quality, open space and visual mix, recreation, wildlife, sight and sound buffers and barriers.

The objective of the streambelt system is the identification, development and management of a network of environmental corridors according to standards that curtail pollution and siltation, reduce hazard of flood loss, provide quality recreation areas, promote scenic beauty, and protect important ecosystems. Streambelts are intended to provide features that promote a satisfying environment and to serve the needs of people for open space.

A suggested system of maps including overlays are recommended as a method to graphically present information about the critical areas.

ALTERNATIVES TO INDISCRIMINATE DEVELOPMENT OF CROPLAND AND FORESTS

Several approaches that are now being used in Connecticut, New York and New Jersey are discussed. These include:

Connecticut - PA-490, Open Space Program, and public land acquisition. These are active programs.

New York - Agricultural Districts and fee simple purchase. These are new programs and have had limited use.

New Jersey - Blueprint Commission on the Future of Agriculture was established in 1971. The Commission will designate an agricultural open space plan. The plan includes a purchase of development easements.

RECOMMENDATIONS

These include recognition of the importance of agriculture and forest lands, the identification and classification of these lands, all lands on slopes greater than 25 percent should remain in forests or permanent cover. All areas of Class I and II land should remain for crop production. The streambelts and wetlands should be preserved.

Other recommendations include revision and improvements in legislation to deal with problems of research, technical assistance, and subsidy programs.

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1.0 AN INTRODUCTION TO THE AGRICULTURAL PERSPECTIVE

The factors involved in the sprawl of cities onto farmland have been extensively documented. While description of what has happened and what should not continue are numerous, the case for keeping land in agricultural and forest use is not nearly as well documented. Until recently, statements about the need to preserve the agricultural production base have met with little enthusiasm. Even though farmland has become urbanized at a steady rate, the expansion and adoption of production increasing technology, have in fact increased the economic supply of land, i.e., increases in yields per acre have induced greater production on fewer acres.

Unbridled city growth and open space reduction are more and more recognized as an inefficient development atmosphere as well as being inconsistent with the environmental concerns of many Americans. Conflicts have arisen between environmentalists and growth advocates. However, in the United States, growth associated with increasing population pressures will not cease in this century. Therefore, it is imperative that policies be established that are a balance between growth and the environmental goals.

Agricultural land use has not been central to the current interest in national land use policy. Information gaps exist regarding the amounts of land actually required for agricultural and forest uses. As cities expand toward farms and forests, the problem at the urban-rural interface is not a land shortage, but rather the lack of effective planning and controls to guide this expansion and to insure that adequate public services and facilities will be provided for the increased population. It is also important that the unique facilities required for the continued success of the present community be preserved, e.g., as the number of farmers in the market area decline, firms supplying farm - related goods and services will eventually close due to lack of profit opportunities.

A number of positions can be taken on agricultural land preservation. The issue is not whether an iron fence should protect farmland from all those who would use it for other purposes. Rather, it is to provide mechanisms which recognize that orderly growth can be beneficial to all parties involved and growth is not necessarily in conflict with environmental goals.

Confronted with the dilemma of growth pressures on one hand and cries for preservation on the other, what guides are available to aid the planner in the identification of critical areas? Ian McHarg and others of his persuasion have established categories of land which they contend should be kept natural, or at least free from development. These include:

- Areas of critical environmental concern.

- Areas for future public recreation.

- Areas that would serve as buffer zones between urban areas and would have a strategic significance in controlling the pattern of future development.

- Unique and highly productive farmland.

2.0 AGRICULTURE AND FORESTRY IN THE LONG ISLAND SOUND REGION

2.1 General Overview

Agriculture in the Long Island Sound region plays a relatively small but vital role in the total economy. While it does not employ a large percentage of the labor force of the area nor contribute a large amount to total earnings, it is extremely important in that it is a primary user of land in the region. Crops and livestock products from these farms go to supply the food needs of the heavy urban concentrations in the region, especially dairy products and fresh fruits and vegetables.

Rural areas also provide living space for a fairly large portion of the region's population. In the four Connecticut counties of Fairfield, Middlesex, New Haven and New London, 20 percent of the total population resided in rural areas in 1970. However, only 1.5 percent of the total rural population resided on farms. For the three New York counties of Nassau, Suffolk, and Westchester, about 7 percent of the total population is classified as rural, but only 1.7 percent of the rural population lives on farms.

Most of the farms in the region are specialized, i.e., at least 50 percent of the farm income is from the sale of a particular commodity. In Connecticut, most farms are poultry, dairy or livestock. On Long Island, the majority of farms are in vegetables, small grains, nursery, and sod. A high

percentage of open farmland is idle and held for speculation.

However, most of Long Island's agricultural area lies south of the Long Island Sound Study area boundary, with nursery plant production the major agricultural income producer in the study area.

The contribution of agriculture to the economy of the Long Island Sound Study area can be indicated by two factors. The value of crop and livestock sales is an indicator of its direct contribution through payment to farmers. Secondly, its indirect effect is provided by the number of business establishments primarily engaged in agricultural services. In 1969, the total market value of all farm products sold from the seven county area was $109 million. There were 1,044 establishments primarily engaged in agricultural services with gross receipts of $56.3 million.

Like agriculture, forestry also provides products and services for both rural and urban residents. In 1970, the forests yielded 3 million cubic feet of roundwood products and 11 million board feet of sawtimber. In Connecticut, pulp and paper, lumber and furniture industries employed about 4,300 persons with payrolls of $26 million annually. The value of forest products from farms increased farmers' income by $100,000. See Table 5 in Appendix A.

The forest land contains growing stock of 900 million cubic feet, which is growing at a rate of 18 million cubic feet annually, including 60 million board feet of sawtimber. The output could be doubled through intensive protection and management. There is a potential for the more rural areas of Connecticut to be self-sufficient in wood products. This would result in increased employment in processing and service-related industries. Without a management program, this forest resource would be wasted through neglect, eventual decay, mortality, stagnation from overcrowding, windthrow and increased insect infestations.

Forest lands provide recreation experience and space. to carry out these activities. Forest areas are particularly attractive to the highly trained and skilled workers who like to live near pleasant surroundings. These people can devote their skills to upgrading the quality of life and economic growth of a community or region.

Agriculture and forest lands are significant for recreation and tourism. Based on land area, they contribute at least 50 percent of the outdoor recreation experience for camping, hiking, picnicking, hunting, etc. National surveys have indicated that some recreationists spend an average of $150 annually for lodging, equipment, and fees for a single activity such as hunting. When this figure is multiplied by the number of activities and number of participants, this adds up to a multi-million dollar industry.

Additional information on agriculture and forest enterprises in the Long Island Sound Study area may be found in Tables 1 through 4 of Appendix A.

2.2 Land Use

Data on land use is available from several sources. The Land Use Work Group developed data based largely on New York and Connecticut aerial surveys. Agricultural and forest land areas and distribution across the planning subregions, as well as information on a county basis is available. The Conservation Needs Inventory (CNI) provides a good overview of the overall trend in land use between 1958 and 1967. Table 1 presents data from the CNI for each of the seven counties. The Census of Agriculture provides a finer level of detail at the farm level.

2.3 Overall Trends

The CNI data shows a considerable shift in land use from that in cropland, pasture, forest, and other to urban and built-up, between 1958 and 1967. In the four Connecticut counties, the acreage classified as urban and built-up increased 24 percent, and in Nassau, Suffolk and Westchester by 74 percent.

What the future will be as far as the rate of increase in urban areas is difficult to assess. Future housing density factors plus the population growth rates will be important determinants. It is possible to project what could occur if the trend of the period between 1958 and 1967 is extended into the future. Assuming that the ratio of change is urban and built-up to the change in population in that period is applied to the OBERS baseline population projections, estimates of depletions of agricultural land can be estimated. Accordingly, the projected losses in acres from 1970 to 1990 and 2020 are:

County	1990	2020
Fairfield	5,200	10,900
Middlesex	6,000	13,200
New Haven	41,000	81,500
New London	35,800	74,200
Suffolk	82,700	182,900
Nassau*		
Westchester*		

These losses are merely indicative of what might occur if nothing were done either to change development patterns and densities or to maintain certain lands in their present state as cropland, forest, or other open space use.

* Changes would not be significant.

2.4 Land Use in Farms

In terms of physical area there are over 3,486 square miles or approximately 2.23 million acres of land in the seven counties of the Long Island Sound Study area.** The Census of Agriculture shows that there were approximately 251,000 acres classified as farmland in 1969, or only 12 percent of the total land area. The remainder consists of urban places, public lands, and other private holdings not classified as farms.

Fairfield County contains about 18 percent of the total land area in the study area but only 6 percent of the county is in farms. Middlesex County contains about 11 percent of the total land area and 10 percent of the county is in farms. New Haven and New London Counties have about 17 and 19 percent of the land area respectively with 12 percent of New Haven County and 22 percent of New London County in farms. Nassau County covers only 8 percent of the total land area, and also has the smallest proportion of its land in farms, slightly over 1 percent. Suffolk County is the largest of the six counties, occupying 27 percent of the total land area, but only 10 percent of the county land is in farms.

Approximately 56 percent of all land in farms in the study area is cropland. About eight percent of the cropland was neither harvested nor pastured in 1969 which is about 1 percent less than the figure for 1964. Cropland used only for pasture had increased from 15 percent of total cropland in 1964 to 19 percent of total cropland in 1969.

** The Study Area is 1,208,719 acres.

An opposite trend is evident in woodland and woodland pasture acreage which declined from 31 percent of the total acreage in farms in 1964 to 27 percent in 1969.

2.5 Characteristics of Forest Land

About 50 percent of the land area or one-half million acres is forest land. This land is on slopes ranging from level areas to slopes greater than 25 percent. The steeper slopes are rocky hillsides and the more level areas in Connecticut are former farmlands. About one percent or 10,000 acres border the beaches of Long Island, New York. Most of the water courses are surrounded or bordered by forest land.

North of the Sound, the composition of the forest area is predominantly oak-hickory type association with elm-ash-red maple, maple-beech-birch and white pine. On Long Island, there are areas of pitch pine within the oak type.

Except for scattered tracts of public owned forests amounting to about 35,000 acres in Connecticut, and probably less than 100 acres on Long Island, the forest land is primarily privately owned.

---- - . ---- ----, COUNTIES INCLUDED IN LONG ISLAND SOUND STUDY, 1958 AND 1967

STATE AND COUNTY	TOTAL LAND AREA 1967	NON INVENTORY ACREAGE: FEDERAL NON CROPLAND 1958	FEDERAL NON CROPLAND 1967	URBAN AND BUILT-UP 1958	URBAN AND BUILT-UP 1967	SMALL WATER AREAS 1958	SMALL WATER AREAS 1968	TOTAL 1958	TOTAL 1967	INVENTORY ACREAGE 1958	INVENTORY ACREAGE 1967
	1000 Acres										
Connecticut	3,127.1	2.7	5.7	322.8	415.5	32.0	31.6	357.5	452.8	2,777.9	2,674.2
Fairfield	401.0	0	.4	83.9	83.2	4.4	4.5	88.4	88.0	316.8	312.9
Middlesex	237.8	0	0	18.5	20.2	1.3	1.4	19.8	21.6	219.5	216.3
New Haven	386.9	0	0	77.4	97.4	5.0	1.8	82.4	99.1	308.0	287.7
New London	427.1	0	0	14.5	40.9	1.1	3.0	18.7	43.9	411.4	383.2
4 Co. Total	1,452.7	0	.4	194.4	241.7	11.9	10.6	209.3	252.6	1,255.7	1,200.1
New York	669.7	266.9	222.5	2,102.7	2,933.1	157.9	162.4	2,527.4	2,318.1	27,701.5	27,351.7
Nassau	192.0	1.4	.6	162.1	190.5	0	.9	163.5	192.0	28.5	1/
Suffolk	590.1	16.4	22.4	131.5	212.1	1.3	1.3	149.2	235.8	316.5	354,3
Westchester	278.4	.5	.0	97.7	277.5	.6	.9	98.8	278.4	179.6	1/
3 Co. Total	1,060.5	18.3	23.0	391.3	680.2	1.9	3.1	411.5	706.2	524.6	354.3

TABLE 1A : LAND USE ACRES IN INVENTORY - 1958 AND 1967

STATE & COUNTY	TOTAL INVENTORY 1958	TOTAL INVENTORY 1967	CROPLAND 1958	CROPLAND 1967	PASTURE 1958	PASTURE 1967	FOREST 1958	FOREST 1967	OTHER LAND 1958	OTHER LAND 1967
	1000 Acres									
Connecticut	2,777.9	2,674.2	358.0	283.9	194.1	130.8	1,965.0	1,928.2	260.7	331.4
Fairfield	316.8	313.0	29.3	18.9	25.3	12.6	215.6	223.5	46.7	57.9
Middlesex	219.5	216.3	23.4	14.2	7.3	4.0	157.9	162.1	31.0	36.0
New Haven	308.0	287.7	42.5	30.2	10.6	8.2	216.5	208.3	38.4	41.1
New London	411.4	383.2	38.8	36.3	23.1	16.0	303.0	283.6	46.5	47.3
4 Co. Total	1,255.7	1,200.1	134.0	99.6	66.3	40.8	892.9	877.5	162.5	182.3
New York	28,153.3	27,351.7	6,978.1	6,640.0	3,536.7	2,235.2	15,202.0		2,436.5	
Nassau	28.5	1/	2.5	1/	1.2	1/	23.4	1/	1.4	1/
Suffolk	316.5	354.3	35.0	65.3	1.5	2.5	250.0	198.5	30.0	88.0
Westchester	179,6	1/	17.0	1/	7.5	1/	137.9	1/	17.1	1/
3 Co. Total	524.6		54.5		10.2		411.3		48.5	

1/ Nassau & Westchester Counties were omitted from the 1967 Conservation Needs Inventory.

Source: Inventory of Connecticut Soil & Waster Conservation Needs and New York State Inventory of Soil and Water Conservation Needs, USDA, SCS, 1967.

TABLE 2: Distribution of Land Use, Long Island Sound Region Counties, 1958 & 1967

	Urban & Built-up		Small Water Areas		Cropland		Pasture		Forest		Other	
	1958	1967	1958	1967	1958	1967	1958	1967	1958	1967	1958	1967
	Percent of Total Acreage											
Connecticut	10.32	13.29	1.02	1.01	11.45	9.08	6.21	4.18	62.84	61.66	8.34	10.60
Fairfield	20.93	20.74	1.11	1.12	7.30	4.72	6.30	3.13	53.76	65.75	11.64	14.44
Middlesex	7.78	8.50	.56	.57	9.84	5.96	3.06	1.68	66.39	68.15	13.02	15.14
New Haven	20.01	25.17	1.30	.46	10.99	7.79	2.75	2.12	55.95	53.84	9.91	10.61
New London	3.41	9.57	.26	.70	9.09	8.50	5.41	3.74	70.95	66.40	10.88	11.08
Total	13.38	16.63	.82	.73	9.22	6.85	4.56	2.81	61.47	60.40	11.18	12.55
New York	6.85		.51		22.74		11.53		49.55		7.94	
Nassau	84.48		0.0		1.30		.63		12.19		.73	
Suffolk	22.18		.22		11.78		.49		56.79		5.66	
Westchester	35.09		.22		6.11		2.69		49.53		6.14	
Total	36.85		.18		8.39		1.09		46.81		4.89	

TABLE 2A: Agriculture and Forest Land Use in Long Island Sound by Subregion

Subregion	1		2		3		4		5		Conn. Total		6		7		869		N.Y. Total		Basin Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Agricultural	37178	9.98	3028	2.55	21523	8.97	6253	4.85	1552	1.16	69534	6.99	2384	3.86	2995	10.75	3091	21.2	8470	8.13	78004	7.1
Forest	218385	58.63	81367	68.59	101217	42.16	51953	40.30	43924	32.75	496846	49.98	3829	6.20	2918	10.47	3387	26.66	10634	10.21	507480	46.2
Subtotal	255563	68.61	84395	71.14	122740	51.13	58206	45.15	45476	33.91	566380	56.97	6213	10.06	5913	21.22	6978	47.86	19104	18.34	585484	53.3
Total Land*	372475	33.91	118632	10.80	240060	21.86	128901	11.74	134101	12.21	994169	90.52	61713	5.62	27858	2.54	14580	1.33	104151	9.48	1098320	100

Table 3 : Distribution of Land Use, Long Island Sound Region, With Comparisons 1959, 1964, and 1969.

Areas	Land in Farms			Cropland Harvested		
	1959	1964	1969	1959	1964	1969
	----------	----------	acres	----------	----------	
Fairfield	31,967	34,031	22,772	10,103	11,131	7,869
Middlesex	57,304	40,820	23,554	15,554	11,997	6,715
New Haven	73,097	57,698	45,834	24,666	20,474	17,193
New London	159,909	121,265	95,198	34,077	27,254	21,669
4 County Total	322,277	253,814	187,358	84,400	70,856	53,446
Connecticut Total	884,443	721,314	541,372	237,512	205,861	162,275
Nassau	7,406	5,565	2,437	4,268	3,512	978
Suffolk	89,776	74,308	61,520	61,621	49,028	53,215
Westchester	25,388	18,605	15,168	7,169	6,165	4,196
3 County Total	122,570	98,478	79,125	73,058	58,705	58,389
New York Total	13,489,516	12,275,308	10,148,359	5,032,671	4,742,718	3,835,623
LISS Total	444,847	352,292	266,483	157,458	129,561	111,835
4 County Total/State Total	36.4%	35.2%	36.6%	35.5%	34.4%	32.9%
3 County Total/State Total	.90%	.80%	.77%	1.45%	1.23%	1.52%

Source: U.S. Census of Agriculture, 1959, 1964 and 1969.

Table 3 : Distribution of Land Use (cnnt.)

Areas	Total Cropland			Cropland Used For Pasture		
	1959	1964	1969	1959	1964	1969
	----------	----------	----------	acres	----------	----------
Fairfield	16,142	18,137	12,916	6,022	5,199	4,350
Middlesex	22,209	17,632	10,197	4,636	3,991	2,445
New Haven	36,526	28,908	24,592	8,472	5,440	5,162
New London	52,889	38,578	38,455	13,225	8,407	12,518
4 County Total	127,766	103,255	86,160	32,355	23,037	24,475
Connecticut Total	350,690	288,041	252,072	79,375	56,265	68,537
Nassau	5,280	4,241	1,565	574	146	436
Suffolk	66,092	59,312	53,557	1,322	2,377	1,263
Westchester	13,373	8,933	8,398	4,526	1,770	3,328
3 County Total	84,745	72,486	63,520	6,422	4,293	5,027
New York Total	7,120,645	6,469,989	6,081,847	1,281,330	990,781	1,492,247
LISS Total	212,511	175,741	149,680	38,777	27,330	29,502
4 County Total/State Total	36.4%	35.8%	34.2%	40.8%	40.9%	35.7%
3 County Total/State Total	1.19%	1.12%	1.04%	.50%	.43%	.33%

Source: U.S. Census of Agriculture, 1959, 1964 and 1969.

Table 3 : Distribution of Land Use (cont.)

Areas	Other Cropland			Woodland and Woodland Pasture		
	1959	1964	1969	1959	1964	1969
Fairfield	1,148	1,807	697	7,423	7,308	5,236
Middlesex	2,019	1,644	1,037	25,234	17,538	8,669
New Haven	3,388	2,994	2,237	21,247	18,919	11,721
New London	5,587	2,917	4,268	71,123	53,897	38,838
4 County Total	12,142	9,362	8,239	125,027	97,662	64,464
Connecticut Total	33,803	25,915	33,803	349,269	278,202	191,799
Nassau	438	583	151	1,078	644	459
Suffolk	3,149	3,720	3,266	11,970	6,257	3,411
Westchester	1,678	998	874	6,633	3,684	2,711
3 County Total	5,265	3,301	4,291	19,681	10,585	6,581
New York Total	806,644	736,490	753,977	3,010,666	2,727,364	2,189,822
LISS Total	17,407	14,663	12,530	368,950	108,247	71,045
4 County Total/State Total	35.9%	36.1%	24.4%	35.8%	35.1%	33.6%
3 County Total/State Total	.65%	.71%	.56%	.65%	.38%	.30%

Source: U.S. Census of Agriculture, 1959, 1964 and 1969.

3.0 PROBLEMS

Land has often been consumed as a commodity rather than managed as a resource. This type of thinking does not give sufficient weight to the scarcity of land, nor to the fact that shifts to certain types of use are for all practical purposes, irrevocable.

The competition for cropland and forest is perhaps more intense at the leading edges of urban growth. However, urban uses scattered throughout the countryside also play an important role. The major conversion from agricultural land has not been directly into cities, but rather into single family homes or subdivisions, which tend to sprawl on the landscape.

The consequences of these actions are some serious impacts on the environment including increased runoff, soil erosion and sedimentation. For example, research has shown that where urbanization is occurring in small forested watersheds, peak flows may increase by as much as 1.5 to 4.5 times due to an increase in the amounts of impervious area. In a localized area, this poses a potential flood threat.

The problem of erosion and sediment are discussed in section 4.4 of this report. For additional information on erosion and sedimentation in the Long Island Sound Study area, refer to Interim Report of the I-6 Work Group. The protection of the land from erosion is related to the density of vegetation. Forests provide the best natural cover minimizing overland flow and runoff. A grass cover is equally effective.

3.1 Encroachment of Urbanization

The random encroachment of urbanization usually creates problems for the owners of agricultural and forest lands.

- Increased costs for community services and higher real estate taxes to the remaining farm units.

- Farm and forest enterprises are lost because:

  a. Urban development including urban sprawl dominates the most productive lands and begins to limit effective and efficient use of these lands.

b. Isolation of the farming enterprise and the loss of vital farm service industry.

c. Land speculation idles some farm land because it raises land costs beyond the financial capability of those wishing to expand and start new operations.

d. Problems of dust, noise, odors, and some unsightly conditions, normal to farm operations but offensive to urban neighbors.

e. Reduced productivity and production efficiency.

f. Problems and costs of controlling farm wastes.

- Reduced environmental quality due to encroachment on floodplains, wildlife habitats, highly scenic or ecologically fragile areas.

- Zoning and land use conflicts.

- The use of groundwater resources for crop irrigation may conflict with residential water use.

- Public water and sewage facilities system may be approved by the local government. This may add a heavy financial burden if assessments are based on frontage of the property.

- An urban-rural mix usually encourages a shift to many small businesses which create highway congestion. This random type development if it continues can contribute to a rural slum-type development.

- Other associated problems include need for more schools, inadequate road system, and a shift in local government leadership which may not have agricultural interest as a high priority.

3.2 Reduced Production Efficiency

Efficiency of production is hampered by uncertainties created by urban inroads into an agricultural area. The presence of development around a farm can influence the owner to defer large capital investments. Consequently his efficiency declines and puts him in a position of competitive disadvantage relative to farmers in non-urbanizing areas.

This may cause him to leave farming and sell his land to developers, thus helping to accelerate land conversion.

Production efficiency may also be hampered if active farming operations become surrounded by urban sprawl. Normal farm noises and odors may be considered so objectionable to the new neighbors that they attempt court action to curtail the farming activity. For instance, where housing developments are interspersed among former orchards, remaining farmers often experience vandalism and complaints about pesticide use. Another example is the location of subdivisions near livestock enterprises even when pollution controls are used effectively.

A third way in which production efficiency is hampered is through the loss of an adequate support base for agricultural operations. As the number of farms in any given area decline, farm-related goods and services such as the local equipment dealer or feed dealership may be forced to close his doors. Such a process is normal with urban growth. However, steps can be taken to insure that this does not happen prematurely.

3.3 Nonrecognition of Agricultural and Forest Potential

It must be recognized that these agricultural and forest lands are more than a site on which to erect buildings. They represent potential production of food and wood fiber, recreation and wildlife. They are also watersheds, open spaces, and natural areas. Because many land use decisions tend to be irrevocable, quality restoration will take decades to accomplish. However, we have the knowledge and mandate to preserve appropriate areas of our best cropland and woodland. The land capability classification system lends itself to the identification of these areas of high agricultural and forest potentials.

The capability system is an interpretive grouping of soils as mapped in the National Cooperative Soil Survey program. The soils information can provide a correlation between soil types and timber growth capacities. This is expressed as a woodland-site index, soil related hazards and use limitations.

Definitions of the eight capability classes are included in Appendix C of this report.

3.4 Potential for Protecting and Managing Forest Land

Assuming that some prime forest lands can be withheld from urban development, there are some optimistic alternatives available to the landowner. Experience has shown in numerous situations that it is possible to encourage and assist owners to practice forestry and to develop and maintain their woodlands in optimum growing condition. Technical forestry know-how is available through existing state and federal authorities. A framework of cost share and incentive programs is in place.

Somewhere between one-half to three-fourths of the forest acreage occurs on highly productive soils from which the outputs of public benefits could easily be more than doubled through intensive protection and management. The marginal conditions that presently prevail can be greatly improved through forestry measures on the 200,000 acres of immature stands, along with those conservation treatments as prescribed in the latest Conservation Needs Inventory.

Since these land treatments will cost about $10 million, or about $1 million per year for the next decade, it is important to examine public benefits closely compared to the costs of alternative environmental consequences. Providing incentives for protection and management of prime forested tracts can generate multiple benefits for the public at large, as well as the individual landowner.

In a sense, cost-sharing is a partial compensation to the owner for paying his taxes, maintaining desired forest conditions, generating jobs and earnings, providing an attractive landscape, and a habitat for birds and wildlife. In generally looking out for the public interest, landowners can assure that future generations will have healthy, well tended, attractive forests producing goods and services, instead of vacant rural wasteland.

4.0 METHODS USED TO IDENTIFY AND CLASSIFY CRITICAL AREAS

In this chapter, methods are presented that may be used by the planners of the Long Island Sound Regional Study in weighing the disruptive nature of certain land use changes. Also, these same methods can be used by local units of government. The areas of concern are the protection of agriculture, forest lands, and streambelt systems. The problems of erosion and sedimentation are also briefly discussed. The mapping of critical areas is outlined in this chapter, and this should be helpful in presenting the information.

4.1 Identifying and Classifying Agriculture and Forest Lands

The need to identify those areas of agriculture and forest land which are of prime importance in the study area is urgent. In order to accomplish this objective, an evaluation of the importance of agricultural forest and grass land was made. The potential disruption that development of these lands would cause in the Long Island Sound area was studied.

Eight basic criteria are considered--production, runoff, soil erosion and sediment control, water quality, open space and visual mix, recreation, wildlife, and sight and sound buffers and barriers.

These criteria were applied to the following breakdowns of agriculture and forest lands.

- Agricultural land on slopes 0-8 percent
- Forest land on slopes 0-8 percent
- Grassland on slopes 8-25 percent
- Forest land on slopes 8-25 percent
- Forest land on slopes above 25 percent.

These groupings in a general way related to the national capability classes. This system is a practical grouping based on the limitations of soils, the risk of damage when they are used and the way they respond to treatment.

The Class I land includes the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in other classes have progressively greater natural limitations.

Class II land includes those soils that have some limitations that reduce the choice of plants or require moderate conservation practices.

Since Classes I and II lands are adapted to a wide variety of crops including forests, these areas are considered prime lands as used in this report. Such land areas are unique and hard to reclaim once converted to urban uses.

Production. This relates to the potential yield capabilities of the land.

- Agricultural Land on slopes 0-8 percent. The loss of this land for farming would have a high economic impact on the area. It would disrupt farming as an industry and also the businesses which support agriculture.

In addition the crops produced in the area are important to the local population. Some examples are milk, poultry, potatoes, vegetables and ornamentals. If these are not produced in the area, then it will be necessary to ship them from distant points placing additional pressures on our rail, highway, and air transportation systems.

- Forest Land on slopes 0-8 percent. The loss of these lands would have a moderate economic impact on the area. The slope range of this grouping suggests a wide range of forest species. The lower range of this slope group is probably regulated by Connecticut's PA-155, Inland Wetlands and Watercourses Act, which would not permit urban development.

- Grassland on slopes 8-25 percent. Grassland has a low impact on the economy as a single land use. However, when considered as part of a farming or agricultural unit, it can be important in a supporting role for a livestock enterprise, especially dairy.

- Forest Land on slopes 8-25 percent. The loss of these lands would have a moderate economic impact on the potential production of forest products.

- Forest Land on slopes greater than 25 percent. The loss of these lands would have a low economic impact on the area.

Runoff. This refers to surface flow of water. This flow may result from rainfall, snow or ice melt. The effects of the forms of precipitation is related to a number of factors including the intensity, duration, time of the year, and cover. In this discussion, special emphasis is placed on cover conditions.

- Agricultural Land on slopes 0-8 percent. The loss of these lands would have a low impact. This is related to the wide range of agricultural management systems. Farms with a good soil and water conservation plan are now holding most of the runoff on the land, however,

those farms with poor management systems are contributing to the runoff.

- Forest Land on slopes 0-8 percent. The loss of these forest lands would have a moderate impact. This is higher than on agricultural land because of the forest soil and cover. This cover is both the canopy effect of the trees, and the duff under the trees.

- Grassland on slopes 8-25 percent. The conversion of these lands to urban uses would have a high impact, and the reasons are rather obvious. The maintenance of a well managed grass cover on the land creates soil and cover conditions that are conducive to the absorption of precipitation.

- Forest Land on slopes greater than 8 percent. The loss of these lands would have an extreme impact. The runoff would contribute to potential flood problems. The need for protection of the land increases in relation to the steepness of the slopes. This need is of such magnitude that slopes above 25 percent should remain in forests unless very definitive and sound conservation measures are used when developing the land.

Soil Erosion and Sediment Control. These two factors are twin problems and are interdependent and interrelated with runoff.

The protection provided by vegetative cover and other conservation practices are vital functions of agricultural and forest lands. The plant communities found on these lands provide the needed cover and binding effects that control soil erosion and the resulting sedimentation of critical ecosystems--wetlands, ponds, lakes and streams.

The amounts of soil erosion can be estimated on a specific area by the use of a soil loss formula. Briefly, this formula takes into account the soil type, cover, length and steepness of slope, rainfall, and conservation practices used. This methodology is discussed in the I-6 Erosion and Sedimentation Report for the Long Island Sound Regional Study. Erosion tables are in Appendix B of this report.

The estimate of the resulting sedimentation from a specific set of conditions is more difficult to estimate. However, factors such as shape and size of the watershed cover condition, and soils affect the amount of sediment produced.

- Agricultural Land on slopes 0-8 percent. The development of these lands would have a low impact on the erosion and sediment problem, provided certain specific steps are taken when the land is converted. During development, a variety of engineering and vegetative practices can be used to reduce erosion and control sediment.

- Forest Land on slopes 0-8 percent. The impact of development would be higher than on agricultural land because the current rates of erosion and sedimentation are much lower than on farmland. However, if these areas are developed, the same practices as discussed under agricultural land have application.

- Grassland on slopes 8-25 percent. The development of these lands for urban uses would have a high impact. The development would necessitate the same practices discussed in previous sections, however, on the steep slopes the inputs including the costs would be greater.

- Forest Land on slopes 8-25 percent. The development of these lands to urban uses would have an extreme impact. The present cover is generally very effective in controlling erosion and sedimentation. Therefore, any development should consider the same items discussed in the previous section.

- Forest Land on slopes greater than 25 percent. The point has been made that runoff and erosion and sediment are related. Also as the steepness of the slope increases, the problem increases.

If development is proposed on these areas, the need for highly effective control measures are in order. In addition, very detailed site investigation should be made to assure that these plans will control erosion and sediment problems.

Water Quality. In this discussion, we are considering the effects on water quality due to pollution from sediment, septic systems, and urban runoff which result in turbidity of the stream and pollution of ground water. It is the general intent to consider the quality of water for the widest possible uses--recreation, fish and wildlife, potable water, and various urban and industrial users.

- Agricultural Land on slopes 0-8 percent. The impact on water quality would be moderate as a result of the loss of agricultural land for urban users. Agricultural land under proper land use or land treatment produces small or limited amounts of sediment. This would increase with urban development particularly during the land disturbance phases. On the other hand, agricultural land does not present the problem of septic pollution. The assumption is that in the hinderlands, subregions 1, 2, and part of 3, the urban development would use on-site sewage disposal systems. The loss of agriculture would eliminate the problems of agricultural pollution, fertilizer, pesticides, and animal wastes.

However, the urbanite probably uses more fertilizer per acre and is not as concerned about time of application to prevent loss due to runoff. He also uses pesticides and herbicides. Urban development means sands and salts for winter snow conditions, and wastes from household pets, etc. In summary, the effects on water quality is directly related to man's interest and the management of the land and water resources whether it is in agricultural or urban uses.

- Grassland and Forest Land on slopes 0-25 percent and above. In the case of forest and grassland, the impact is high to extreme. The reason is that under a well managed grass or forest condition, erosion is low and there are very few chemicals added to the land. However, the potential sediment problem exists as discussed in previous sections and again it is emphasized that forest land above 25 percent slope can present some severe problems related to runoff and sediment.

Open Space and Visual Mix. This is an attempt to evaluate several different yet related factors of land use. Elements involved here are the importance of forests and agricultural lands in maintaining open space, the significance of land use diversity, the amount of land needed to maintain or improve the quality of life or inherent character of an area, and the value of these lands to the area, region, state or nation. If parts or all of this land use are eliminated, there would be an adverse impact on the aesthetic aspects and the quality of living.

- Agricultural Land, Grassland, and Forest Land on slopes 0-25 percent and above. The impact on the visual mix is from moderate to extreme if the land is converted to urban uses. Since the importance of

this factor is interrelated to land uses and topographic conditions, it is discussed as a composite unit of all land uses.

One accepted belief is that many people have a desire to move from the more highly populated centers to those areas of less density. The motivations and goals behind the desire to live in proximity to open space differs between individuals. One is to have access to settings providing a visual mix of cropland and forests.

Recreation. This is an attempt to evaluate the present value of the agricultural and forest land for recreation uses, but more important it looks to the potential as the population increases and other demands on the land increase. In determining the impact of losing this land, it is important that the potentials for the whole range of leisure time activities be considered. These areas may in fact be the untapped recreational resource needed to meet the future's rising demands. The loss of such lands now will reduce the future possibilities for multiple-use of these lands.

One of the most important and often overlooked effects on recreation is the elimination of the land use diversity. The loss of open space and visual mix could drastically reduce the value of an area for recreation.

- Agricultural Land on slopes 0-8 percent. Agricultural land has a wide variety of potential recreational opportunities that cannot be duplicated by any other land use. Therefore, the loss of this land to urban uses would have an extreme impact.

The list of these potentials is only partial in this report. Some of these are hiking, hunting, fishing, camping, trail riding, snowmobiling, ice skating, birdwatching, rural living, nature study, etc.

The mere existence is highly valued by those who enjoy undeveloped land and is therefore important to the sightseer-recreationist.

- Forest Land on slopes 0-8 percent. The loss of these lands would have a moderate impact. Forested lowlands furnish places for hiking, hunting, birdwatching, camping and simple nature appreciation. If these areas are near schools, they have potentials for outdoor education.

Wooded areas along streams and rivers enhance the experience of water recreation by lending these areas a tranquil atmosphere. These areas are generally a component of the streambelt environmental corridors.

- Grasslands on slopes 8-25 percent. The loss of these areas would have a moderate impact on the recreation uses in the study area. The open hillsides provide several potential recreation areas. Due to their openness and grassy condition, these areas are available for activities such as hiking, nature study, hunting, snowmobiling, skiing, riding and sightseeing.

- Forest Land on slopes 8-25 percent and above. The loss of this land would have from moderate to low impact. Because of the slope involved, recreational potential on inclines is reduced. There are, however, some forms of recreation very well suited to the forested slopes. The expanses of steep forest land can yield undeveloped areas for dispersed recreation. Activities requiring large uninterrupted forested areas could be based on these steep slopes. Good hunting can often be found on these slopes when the area has a good mix of forest, open, and agricultural lands. Hiking is another activity suited to such slopes due to available hillside vistas. These hillsides when forested in hardwoods, produce highly colorful fall foliage for viewing.

Wildlife. Most forms of wildlife require diversification of habitat conditions. The critical element in the quality of Connecticut's wildlife habitat is the continuing need for a mix of woodland and openland. These lands for the most part are privately-owned and are either farms, woodlands, or a combination of these.

The critical needs of woodland is to have openings of various sizes within wooded areas for the production of shrubs and grasses. In the case of openland, it is the edge necessary for shrubs, sprouts, and plants that produce buds and seeds.

The changes of land use that result in the loss of this combination of woodland and openland can endanger most species of wildlife.

- Agricultural Land on slopes 0-8 percent, and Grassland on slopes of 8-25 percent. The loss of agricultural land and grassland to urban uses will have a high impact on wildlife. This impact would be reflected in the loss of food and cover.

Agricultural land produces a variety of food by the application of conservation practices such as strip-cropping which furnish edge and a variety of crops in a small area. Plant cover losses affect breeding, nesting, and loafing areas.

- Forest Land on slopes of 0-25 percent and above. The loss of these lands would have a moderate impact, and would affect the cover and food elements provided by forests.

Cover is needed for escape, loafing, breeding, and nesting areas. This cover is furnished by den trees, brush piles near woodland edges, hardwoods of all ages, understory and coniferous trees.

Food is furnished by shrubs, grass and legumes along roads, trails and woodland openings. The forest furnishes seeds from coniferous trees, buds, shoots and bark from both hard and soft woods.

Sight and Sound Buffers and Barriers. The values of sight and sound buffers and barriers are not always evaluated in a comprehensive approach to land use planning. Also, the importance of sight and sound pollution is not considered as a concern in the attempt to have a high quality environment.

Forest, grass and agricultural lands are important components of a system of sight and sound buffers and barriers. These areas absorb noise and supply separation between land uses which effectively develop a green belt and/or streambelt system.

Forest and agricultural land between urban areas and transportation and transmission lines can alleviate some of the undesirable sounds associated with high speed travel. These areas at the same time will furnish a pleasing aesthetic and scenic community.

- Agricultural Land on slopes of 0-8 percent. The loss of this land would have a moderate impact on the sight and sound buffers and barriers.

Agricultural land provides valuable sight buffers between incompatible land uses. Farm land can reduce the visual impact of an industrial complex in an urban area because it separates and buffers one impact from the other. Agricultural areas also buffer sounds because of distance provided by the land area.

- Forest Land on slopes of 0-8 percent. The loss of this land would have a high impact on the area. Because of their foliage, trees effectively screen unsightly conditions or unpleasant sounds. The relationship of tree height to the slope of land is also an important factor.

The planting of wooded strips along highways in urban areas will reduce the impact of each land use on its adjoining area. Trees effectively benefit the scenic aspects of an area.

- Grassland on slopes of 8-25 percent. The loss of this land would have a moderate impact on the area. This loss in many respects would be comparable to the loss of agricultural land. Grassland acts as a buffer zone by providing a transitional area between land uses. It adds variety to the scenic patterns when in combination with agricultural cropland and forests. These areas are also beneficial as an erosion control practice.

- Forest Land on slopes of 8-25 percent and above. The loss of this land would have a high impact on the area. Forested slopes have an absorptive rather than a reflective surface, thus the noise levels are lowered. This forest cover has the effect of camouflaging scattered nodes of development on these slopes.

The mix of tree species adds to the scenic and aesthetic values of the area. This backdrop of changing colors from season to season is a scene that cannot be duplicated if land use changes are made that are of an irreversible nature.

4.2 Streambelts - A System of Natural Environmental Corridors

The objective of the streambelt system is the identification, development, and management of a network of environmental corridors according to standards that reduce pollution and siltation, reduce hazard of flood loss, provide quality recreation areas, promote scenic beauty, and protect important ecosystems. Streambelts are intended to provide features that promote a satisfying environment and to serve the needs of people for open space.

Empirical studies, particularly those of Philip H. Lewis, Jr., in Regional Design for Human Impact, have shown that frequently the most significant environmental resources are concentrated in a lineal pattern, generally within and along the walls of stream valleys.

Lewis calls these concentrations "environmental corridors." This pattern occurs generally because such resources are now or at one time were water-related. As a result, watercourses, floodplains, steep slopes, poorly drained soils, wetlands, aquifer outcrops, important wildlife habitats, historic sites, and areas of scenic beauty may combine into a system with fairly distinct boundaries. Such an area could be considered the least tolerant to development because of its ecological importance, its scenic beauty, its recreational value, and its long-term economic value in preserving the quantity and quality of the water supply and in reducing the risks and hazards of development. Public policy, therefore, would call for retaining such areas in their open space condition.

The quality of the environment for the people of the Long Island Sound Regional study area is to a great degree linked to the streams and their associated lands--"streambelt environmental corridors." In these corridors of land and water are vital natural resources that deserve priority consideration with respect to land use planning and management.

For most towns, there is still time to conserve and develop the natural resources of the streambelt corridors. For the most part, urban buildup has not encroached to the point where few streambelt possibilities exist.

However, in virtually every town there is evidence of irretrievable destruction of streambelts. The expected population growth and resultant urbanization will greatly increase the hazard of uncontrolled development in these areas if action to protect them is postponed.

Critical Components of Streambelts are:

- The watercourse of a defined stream including banks, bed, and water.

- Lands subject to stream overflow.

- Associated wetlands.

- Shorelines of lakes and ponds associated with the stream.

- Areas in proximity of streams where certain developments or land uses probably would have adverse environmental effects, i.e, pollution and health hazards, erosion and sedimentation, destruction of ecological systems.

Optional Components of Streambelts are:

- Contiguous lands with special environmental values i.e., wildlife habitat, aesthetic, public recreation, scenic, historic, etc.

- Potential water development sites of public significance.

- Other areas necessary as links to form a continuous streambelt system.

4.3 Maps Used to Identify Critical Areas

The first step in the use of a system of overlay maps is to determine the purpose and use of the maps. Secondly, the various sources of information available must be inventoried. Then the next decision to be made is the kind of base map to use, at what scale, and the number of overlays.

Generally overlays can best display the information because the various components of a system can be shown individually or in any combination to depict the inter-relations or conflicts between the components. A basic rule to follow is not to substantially change the scale of the original material, however, a uniform scale must be used.

Some examples of maps that can be prepared as an overlay system are included in Appendix D. However, due to limitations of reproduction of this report, it was not possible to illustrate these maps on transparent material.

The U. S. Geological Survey was used as a base map, (Fig. 1) and the overlays were developed as follows:

- The overlay showing slope was made from the U.S.G.S. topographic map. (Fig. 2).

- The active agricultural land was taken from land use maps of the Connecticut's Land Use Mapping (SLUCONN). New York's system is known as LUNR. Both of these systems identify many land uses, however, only agriculture was used in the example. (Fig. 3).

- Prime agricultural land was based on the detailed soil surveys which can be interpreted by the national system of land capabilities. This map shows areas of Class I and II land which are considered prime agricultural areas. (Fig. 4).

- General Soils Maps can be used to map prime agricultural land. However, the areas are not as point specific as when the information is taken from the detailed soil survey. Also, there are inclusions of other lands. (Fig. 5).

- Forest land was developed in the same manner as agricultural land. (Fig. 6).

- Forest land 25 percent and above was developed as a combination of slope map and forest cover map. (Fig. 7).

- The streambelt corridor map was developed by using the criteria as described in the Guide for Streambelts. The criteria is based on soil survey information. In addition to a map study, a field inventory was made. (Fig. 8).

4.4 Upland Erosion and Sedimentation

it is not possible to separate problems of soil erosion entirely from problems of sedimentation. Damage is reflected at the site where soil is eroded, where the resulting sediment remains as suspended loan, or where sediment is deposited in stream channels, estuaries, and Long Island Sound.

Man's activities on the land have accelerated erosion beyond that produced by natural geologic processes such as normal degradation by water, wind, ice, and gravitational creep. The soil erosion and sedimentation that result constitute a major problem in our country. Although the problem is less severe in the LIS Region than in most parts of the country, it is still significant. In this region, per acre soil erosion soil losses from construction sites are four times greater than those occuring on cropland and about 80 times greater than those occuring on forest lands.

Erosion removes fertile soils, cuts rills and gullies, and washes out roads, banks, and fills. Sediment from this process blocks culverts and covers highways, constituting hazards to motorists. Sediment, the product of the erosional process, is our major pollutant by volume. It does damage to land and water, and to constructions of man.

Kinds of erosion damage being sustained. Upland erosion by water can be divided into two broad categories--sheet erosion and gully erosion. Sheet erosion including rill erosion by water, is defined as the removal of a uniform depth of soil from the land surface by water flowing over the surface without the formation of major channels.

Sheet erosion can also be caused by wind action, however, while some wind damage occurs on these parts of the north shore of Long Island exposed to high-speed winds from the Sound, this cause is of minor importance in the region as a whole. Wind erosion also affects bare fields. Wind erosion is especially serious on intensively farmed fields in the Long Island Sound area. In an aerial survey conducted by the U. S. Forest Service, eight such problem areas were identified as needing stabilization measures.

Gully erosion is the process whereby water concentrates in narrow channels and removes soil to considerable depths, resulting in major depressions in the landscape. Gully erosion is of minor significance in the study area, however, where it occurs, mainly on construction sites and roadbanks, the damages are extensive.

Damages to the land as a result of erosion occur through the loss of soil, the breakdown of soil structure, the reduction of depths of topsoil, and the loss of organic matter, nutrients, and essential micro-organisms. Eroded soil results in a reduction of crop production and an increase in the costs of agricultural operations.

Kinds of sedimentation damage being sustained. Like many natural phenomena, sedimentation produces both benefits and damages. In general, some sedimentation is probably beneficial, but too much can become destructive. For example, riverborne sediment particularly the fine-grained materials held in suspension can muddy otherwise clear watercourses and contribute significantly to harbor pollution, to the need for peiodic dredging, and to the turbidity of the Sound.

Sediment depositions can fill stream channels and impair their downstream flow. As a result, the overall water table in an area can rise, thus reducing crop yields on adjacent lands. The process of sedimentation can also involve the deposition of infertile materials such as sand and gravel on the floodplains, an occurrence which can further reduce their productivity.

Sediment must be removed from man-made structures, drainage improvements, and channels for their continued effectiveness. Damages from sedimentation are computed to include such things as the cost of removing sediment from municipal and industrial waters, the increased cost of retention chambers and flocculating chemicals for water treatment plants, and the increased wear on pumps and the treatment plants themselves.

Sedimentation can also damage transportation facilities such as highways and railroads through depositions in ditches, culverts, and bridges as well as on the roadways and railbeds themselves, all of which tend to increase the cost of maintenance.

Sediment can reduce the aesthetic and recreational appeal of many streams, lakes, ponds, and resrvoirs for swimming, boating, fishing, and other water-based recreation activities. Sediment can also have a detrimental effect on both finfish and shellfish populations. It can destroy the spawning beds of game fish by smothering their eggs and reduce their overall food supply.

Current erosion losses. Appendix B lists 12 sources of upland erosion. For each source, and for the region as a whole, it estimates the acreage affected, the rate of soil loss, and the total annual soil loss. The regional annual rate of soil loss is 1.35 tons per acres. It varies from a low of 0.76 in subregion 4 to a high of 2.76 in subregion 6. The appendix brings out several other regional perspectives.

- The rate of soil loss is by far the highest along streambanks, but because the loss is so highly localized, this source makes up only 2 percent of the region's total.

- The second highest rate of soil loss occurs from construction sites. Although they cover a relatively small area, the losses occuring at these sites account for 12 percent of the regional total.

- The only other high rate is for untreated cropland. Losses from this source constitute 32 percent of the region's total. This rate of loss would be much higher if nearly a third of the region's cropland were not already adequately treated.

- Erosion loss rates in urban areas are only a tenth of the rates for untreated croplands, but since urban areas are much larger, they contribute 21 percent of the region's losses.

- The remaining 33 percent of the region's losses is widely distributed over the three-fourths of the region that consist of woodlands, pasture, adequately treated cropland, roadbanks, and other land.

Except for losses from streambanks, construction sites, and roadbanks, the losses in Appendix B were calculated by using the Universal Soil Loss Formula. The formula is expressed as A=RK LSC, where:

A= the rate of soil loss for a land use in tons per acre per year
R= a rainfall erosion factor
K= a soil erodibility factor for each soil
LS= a slope length and gradient factor
C= a crop management factor.

Different land uses and their extents were taken from Conservation Needs Inventory data, completed in 1967. The data for Connecticut was developed within the framework of the National Inventory of Soil and Water Conservation Needs. Acreage figures of more recent land use surveys may not compare exactly.

The data source for the New York portion of the study area was the Land Use and Natural Resource Inventory, completed in 1967, commonly referred to as LUNR. This study was conducted by the New York State Office of Planning Services. The methodology is a combination of aerial photography, stereoptical interpretation of the photos, and computer display of data.

The following land uses were identified by the Conservation Needs Inventory: cropland in tillage rotation, orchard and vineyards, open land formerly cropped, pasture, woodland, federal land, urban, water areas, and other land, (miscellaneous areas on farms such as farmsteads). The LUNR Program in New York identified the same land uses and others.

The method used to determine the number of construction sites, roadbanks, and streambanks, and the rate and amount of gross erosion therefrom was based upon on-site investigations of representative sample areas. These samples were expanded to include the entire study area.

Current sediment losses. As can be computed in Appendix B, the average annual sediment yield throughout the Long Island Sound Region is 0.101 tons per acre. Average yields range from a low of 0.057 tons in subregion 5 to a high of 0.207 tons in subregion 6. Erosion rates in subregions 7, 8, and 9 are high, but because their land area is small, their total sediment yield is also small.

Gross erosion and sediment yields are not synonymous because of the progressive deposition of eroded materials enroute from a point of origin to the point under consideration in an area. Sediment yield correlates with erosion inasmuch as a decrease in erosion generally results in a decrease in sediment yield.

The estimates of sediment yield were made by use of the following equation: Y=E(DR), where:

- Y = Sediment yield (tons/unit area/year).
- E = Gross erosion (tons/unit area/year).
- DR= Sediment delivery ratio.

The gross erosion in the study area represents the summation of all the erosion taking place. It includes sheet, rill, gully, streambank, and roadbank erosion, as well as the soil loss from construction sites. The estimated delivery ratio is the comparison of sediment yield to gross erosion expressed as a decimal fraction of the erosion. The delivery ratio (0.075) used in the North Atlantic Regional Water Resources Study was used to estimate sediment yields in this study.

An attempt to refine or otherwise modify the delivery ratio was not made. The various parameters such as drainage areas delineation, watershed and sediment-erosion characteristics which are necessary for such a modification were lacking in the type of study undertaken for the Long Island Sound area. Consequently, the 7.5 percent value previously developed was deemed viable for application in this report.

Future studies may afford the opportunity to evaluate these parameters resulting in an appropriate delivery ratio adjustment. Additional research may indicate a relationship between between land uses and sedimentation rates, for example good vegetative cover such as afforded by forest or grasslands may have lower delivery rates.

The amount of sediment carried by streams is affected significantly by flow conditions. During periods of base flow, when the streamflows are maintained largely by groundwater discharge, sediment concentrations are normally relatively low and change little from day-to-day. In small streams direct storm water runoff lasts only a short time, thus allowing a rapid change of the water and sediment content. In large rivers, however, the duration of a storm discharge is much longer so that the water and sediment concentrations change more slowly.

4.5 Use of Soil Survey in Urbanizing Areas

Soil surveys provide basic land information for many kinds of planning considerations and undergirds the cooperative understanding of various disciplines to promote sound land use planning.

The use of soils information was discussed in the agriculture and forestry, streambelts, and upland erosion sections of the report. It is the intent of this section to point up the use of soils information in those areas of the LIS regional study area that are being developed for urban purposes. The I-5 Soils Report is an additional reference.

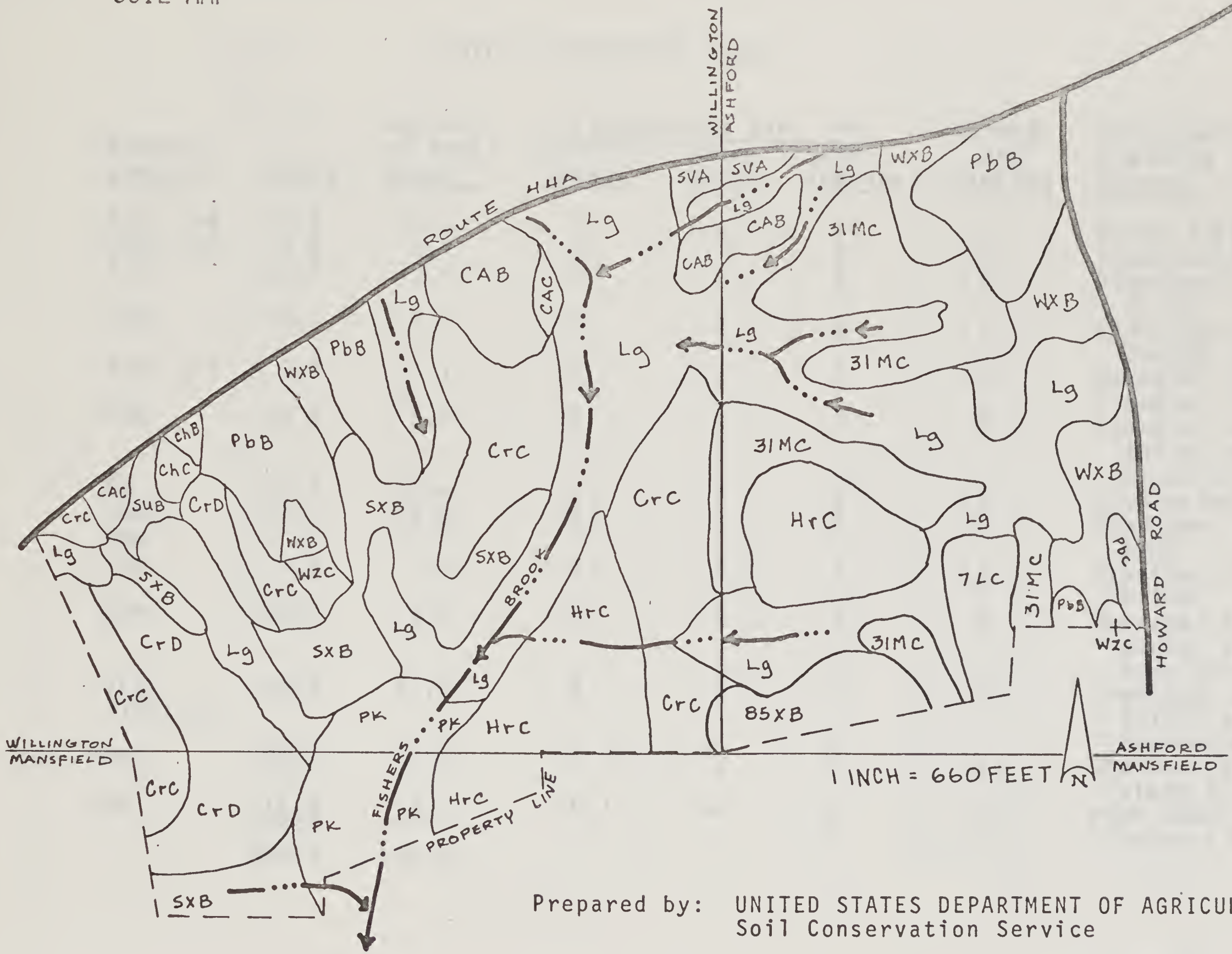
Soil surveys properly interpreted are needed to provide facts to the local decision makers. Soil interpretations for a specific use are expressed as a degree of limitation for the use. Physical properties as delineated by the soil survey are considered. Important physical properties include soil depth, texture, structure, permeability, available moisture, slope, stoniness, size and spacing of rock outcrops, and frequency of flooding.

The following are some of the interpretations that can be made--on-site sewage disposal systems, homes with basements, homesite landscaping, streets and parking lots, athletic fields, sanitary landfills, picnic areas, and camp sites.

The degree of limitation is rated slight, moderate, severe or very severe. A rating of slight indicates that any limitation affecting the use of the soil is relatively unimportant, and can be overcome in a short time or at little expense. As the limitation increases, the needed inputs in terms of effort and expense also increase. The severe ratings do not imply that a soil cannot be used for a specific purpose, but instead it means that certain limiting soil factors need to be overcome or modified.

Pages 33 and 34 are examples of a soil map and accompanying chart which show limitations, etc.

SOIL MAP



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE *SEPTEMBER, 1973*

SOILS LIMITATIONS CHART

Mapping Symbols	Acres	Percent of Total Acres	Limitations for: ** On-Site Sewage	Basements	Landscaping	Streets and Parking	Principal Limiting Factor
CaB, ChB	14.5	5.5	1	1	1	2	Slope 3-8%
CaC, ChC	3.0	1.1	2	2	3	2	Slope 8-15%
CrC	36.0	13.6	2	2	3	3	Stoniness, slope 3-15%
CrD	17.3	6.5	3	3	3	3	Stoniness, slope 15-35%
SvA, SvB	3.0	1.1	2	2	2	2	Seasonal high water table
SxB	18.2	6.9	3	3	2	2	Seasonal high water table, stoniness, slope 3-15%
Lg	69.9	26.4	4	4	4	4	High water table
85XB, PbB	21.1	8.0	2	1	1	2	Fragipan, slope 3-8%
PbC	1.0	.4	3	2	1	3	Fragipan, slope 8-15%
WxB	16.7	6.3	3	2	2	2	Seasonal high water table, fragipan, stoniness
7LC, 31MC, WzC	29.8	11.2	3	3	3	3	Fragipan, slope 3-15%, seasonal high water table
HrC	23.5	8.9	3	3	3	3	Shallow to bedrock, slope 3-15%
PK	11.0	4.1	4	4	4	4	High water table, organic material
	265.0	100.0					

5.0 ALTERNATIVES TO INDISCRIMINATE DEVELOPMENT OF CROPLAND AND FORESTS

The responsibility to develop and implement a plan to maintain crop and forest land is the authority of the state and local units of government and special districts. It is important that agricultural land in farm units not be isolated bits and pieces, but must make up an agricultural area of adequate size.

One poorly planned sub-division can severely affect the integrity of an agricultural area. This is not immediately apparent but inevitably assessments and taxes go up to pay for the additional schools and services needed by the new residents. The burden falls on farms not requiring these services which in turn puts more economic pressure on the farmer to sell his land for development.

Several approaches are being taken including:

- tax incentives
- restricting development to sewered lots
- conservation zoning
- clustering
- transferable development rights
- scenic assessments
- agricultural zoning
- land trust
- farmland assessment contracts
- public purchase.

Approaches being taken in Connecticut, New York and New Jersey fall primarily into the category of farmland assessment contracts, and public purchase. The experiences in each state are briefly discussed below.

5.1 Connecticut

PA-490. The Connecticut Open Space Program consists of four major segments:

- A system of grants-in-aid to assist municipalities with the acquisition of land and water areas for conservation and recreation.

- A program for state acquisition, either by outright purchase or purchase of rights, of areas of strategic importance in the overall natural resources plan.

- A use-value assessment law to encourage owners of the several categories of open-space land to retain it in its natural state.

- An all-out effort to end water pollution as a serious problem in the state. Since 1963, additional segments have been developed in a continuing program to amass a package of techniques to implement policy.

Connecticut's PA-490 came out of pressures in the early 1960's to preserve dwindling open spaces in the State. This act provides for use-value assessment. PA-490 declared it to be in the public interest to preserve farm, forest, and open-space land and to prevent their forced conversion to more intensive uses as the result of economic pressures caused by the assessment thereof for purposes of property taxation at values incompatible with their preservation such as farmland, forestland, and open-space land.

Under use-value assessment, land is taxed on the basis of its agricultural productivity rather than its value in alternative uses. This enables farmers to avoid being forced to sell out because of increased taxes based on potential rather than actual use.

Experience with the use of the Act has been building slowly. Until 1969-70, reliance upon use-value assessment was limited to only a few towns. Many towns had not re-valued real property and were using 1959-60 market value levels. These were often below the recommended use-value levels.

Re-evaluation toward the end of the decade has brought a high level of participation by farm and forestland owners. Within and at the boundaries of the urban sprawl areas, land

under PA-490 appears to be holding the line against encroachment. But perhaps this is also a function of high interest rates, high building costs, and uncertain employment. The forces which influence growth are so complex that amassing statistically valid evidence is difficult.

Those working with landowners in Fairfield County (adjacent to New York City) are convinced that large acreages of forest land protected by PA-490 will continue in forest. Evidence is accumulating to support such observations. In most towns of the central valley, all qualifying farm and forest land has been placed under PA-490 and appears to be holding land from development. A farmer from this area reported that his farm had been in the family for 11 generations. In 1969, real estate taxes increased from $2,400 to $28,000. Had it not been for PA-490, he would have been forced to sell. However, small blocks of land not under this Act are being developed slowly. At the northern end of the valley, one town extended sewer service extensively. Choice locations have moved into new commercial and home sites.

Individuals who have assessed the functioning of PA-490 have judged that by breaking the cycle of high market value-high assessments, great pressure has been removed from the farm and forest land owners to sell prematurely. However, unique situations will arise where purchase offers will be irresistible. But this is expected. The framers of the Act have stated again and again that use-value assessment is not the answer but only one part of an answer to the rational development of an area. PA-490 has bought years of time to study the problems and to help develop a package of solutions.

Two operational problems of PA-490 concern the identification of qualifying land and the determination of the appropriate use values. Both of these problems have been resolved in Connecticut. The landowner must make application to determine if a particular plot of land qualifies for differential assessment and the local assessor makes the determination. If the land qualifies, then the use-value per acre can be determined by dividing the annual net rent per acre by the interest rate.

Public Land Acquisition. The Connecticut Department of Environmental Protection has proposed that Connecticut spend more than $61 million to acquire 35,000 new acres of public land. This recommendation is part of the State Outdoor Recreation Plan. While priorities are given to offshore islands, tidal wetlands, unique natural areas, and water supply sites, it contains provisions for purchasing of agricultural land for public hunting with leaseback arrangements for farming.

5.2 New York

Agricultural Districts. Agriculture in Suffolk County, New York, is being pressured by developers. The value of land for development is far in excess of its value for agricultural production. Some of the farmers however, would like to remain in farming for a few years themselves, and some would like to make arrangements to keep their farms in this use beyond their life span. Several possibilities exist.

Under New York State legislation of 1971, the mechanism for forming agricultural districts was created. There has been some preliminary inquiries into the formation of districts, but none have been formed. Farmers have pointed out that while a district would enable their continuance in farming until the farm passes on to the next generation, both the state and federal governments would appraise farms at the going market price for inheritance purposes. This could force dissolution of the business. Farmers generally have been reluctant to waive potential sales for other benefits such as tax savings.

Fee Simple Purchase. Another approach for preserving land for agriculture, open space and recreation amenities is being taken by the Suffolk County Legislature. Money for outright purchase of agricultural land has been set aside in the capital spending programs. A total of $45 million has been allocated for purchase of land at a rate of $15 million per year from 1974 through 1976. These purchases are designed to acquire land now in agriculture but destined for speculative development, primarily in Riverhead and Southhold towns in Suffolk County. The goal is to preserve at least 9,000 acres of farmland from irreversible development. The most attractive areas are those which are the most desirable for farming and which need the greatest protection against encroachment by competing and conflicting land uses.

5.3 New Jersey

In New Jersey a Blue Print Commission on the future of that state's agriculture was established in 1971. The Commission recommended adoption of agricultural open space plans administered jointly by the state and local municipalities with these features.

- Under the plan, each municipality in the state would be required to designate an Agricultural Open Space

Preserve within its boundaries composed of at least 70 percent of its prime farmland. The preserve would become part of the local master plan and should reflect the local needs for open space and other agricultural benefits.

- Landowners whose properties are located in a preserved area would be able to sell the development easements to their land to the state administering agency or to others.

- The rate of compensation for development easements would be the difference between the market value for the land and its farm value.

- At the option of the landowner, the easements could be held for later sale and the compensation for delayed sales would reflect the increased development value of the easement had the preserved area not been established.

- The program would be financed by a tax on all real estate transfers in the state. The rate would be at 4 mills or 4/10 of 1 percent of the transfer value at the time of the sale. In nearly all instances, the tax would be paid from realized capital gains on the real property transferred.

- The responsibility for administration of the program would be vested in a Board of Directors composed of persons appointed by the Governor and approved by the Senate and selected ex officio members of state government. The professional staff would be attached to the Department of Agriculture.

6.0 RECOMMENDATIONS

The following recommendations are proposed:

1. Agricultural and forest uses be recognized as an important land use in the Long Island Sound Region.

2. Conversion of agricultural and forest lands to other uses should occur only as part of long range planning effort which recognizes the contributions of such land uses and the consequences of irreversible decisions.

3. A classification method, be used to identify areas best suited to remain in agriculture and forestry. Accordingly,

- All lands on slopes of 25 percent and over should remain in forests or be planted to forests to aid in flood and erosion control. However, an exception is the north shore bluff on Long Island. Large trees on these slopes would create a number of problems which generally increase erosion and sedimentation. These areas are more successfully protected by grass or shrub type of vegetation.

- Policies should be developed to enable viable farm units with Capability Class I and II land to remain as economic units.

- All areas with soil capability classes I and II (the most productive) should be recognized as having a potential for crop production and should not be indiscriminately converted to other uses.

- Streambelts and inland wetlands should remain as such, due to the role they play in soil protection, water control, wildlife habitat, and aesthetic amenities.

4. Improve the effectiveness of Connecticut PA-490 through two changes:

- The landowner filing an application under the Act should be required to include a conservation plan as part of the application. The assessor could use the plan to determine soil types and establish the fact that the farm unit meets the requirements of the Act.

- Under the open space section, the planning commission should give priorities to streambelts, prime agricultural land and forest land as designated in this report, when developing open space plans.

5. Further investigation is needed to determine the applicability of the public purchase of crop and forest lands in the Long Island Sound Region. Such purchase may be of fee simple title or may take the form of purchase of easements or development rights.

6. Technical assistance and research should be accelerated to give needed help to landowners of agricultural and forest land. This help can encourage owners to obtain the highest level of production possible.

7. Where it is determined to be in the public interest to maintain land in agriculture or forestry, cost sharing programs or other types of compensation should be used as one means of incentive to the landowner.

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APPENDIX A

CHARACTERISTICS OF AGRICULTURE IN THE LONG ISLAND SOUND REGION

Number of Farms, Farm Size, and Value of Land and Buildings

The number of farms in the study area in 1969 was 2,627, a 47 percent decrease from the 1959 level of 4,954. (Table 1). Fairfield County increased the number of its farms from 374 in 1959 to 408 in 1964. With that exception, all of the counties in the study area have experienced a steady decrease in the number of farms since 1959.

The average size of a farm in the study area was 95.7 acres in 1969, a 13 percent increase over the 1959 farm size of 84.7 acres.

There is a marked difference in size of farm among the counties in the study area. The average size of a farm in New London County is 135.6 acres compared to an average farm size of 29.3 acres in Nassau County. For this reason, data relating to the entire study area cannot be construed to be indicative of any one county or subregion.

Average value of land and buildings per farm has risen steadily since 1959, reaching a high of $164,114 in 1969. Per farm values have risen more rapidly than values per acre due to increased farm size. Per acre investment rose 141 percent from $712 per acre in 1959 to $1,715 per acre in 1969. Per farm values rose 172 percent from $60,324 in 1959 to $164,114 in 1969. Per acre investment in 1969 ranged from a low of $536 in New London County to a high of $7,262 in Nassau County. (Table 2).

Agricultural Services, Receipts and Payrolls

In 1969, there were 1,044 establishments primarily engaged in agricultural services in the study area. (Table 3). Sixty-four percent of these establishments were located in the two New York counties. The highest proportion, 45 percent of the establishments were located in Nassau County while the lowest proportion, 2.8 percent of the establishments were located in Middlesex County. Nassau and Suffolk Counties contain 31 percent of the total number of establishments in New York State.

Gross receipts for agricultural services in the study area were $56.31 million in 1969. Seventy percent of these receipts came from the two New York counties. Receipts ranged from a high of $26.12 million, 46 percent of the total in Nassau County to a low of $1.41 million, 2.5 percent of the total in New London County.

The annual payroll for agricultural services was $19.34 million in the study area in 1969. Nassau and Suffolk Counties accounted for 71 percent of the annual payroll. The percentage of the annual payroll ranged from a high of 48 percent in Nassau County to a low of 2 percent in New London County.

Value of Agricultural Production

In this section, information on the gross value of agricultural product sales is given. Values indicate only sales receipts of farmers and not net returns or profits to the farm operator. Also, the data in this section does not include value added through processing and manufacturing of agricultural products in the study area.

Value of All Farm Products

Total market value of all farm products sold in the study area was almost $109 million in 1969, an increase of $2.5 million over sales for 1964. (Table 4).

Suffolk County accounted for 40 percent of the total value of agricultural products from the study area. By contrast, Nassau County produced less than 5 percent of the total value of agricultural production in the area. Average sales per farm vary from a low of $16,799 in Fairfield County to a high of $67,655 in Suffolk County.

Value of Crop Production and Livestock, Poultry and Their Products

Sales of crops including nursery and hay in the study area exceeded $56.2 million in 1969, approximately $200,000 less than was reported in 1964. (Table 5). This decrease reflects changes in both quantity and price.

The value of livestock, poultry, and their products sold in the study area was almost $48 million in 1969, about $3 million more than was reported in 1964 (Table 5).

Value of Farm Forest Products

Census of agriculture data on forest products pertain only to products cut on farms. Commercial logging, timber operations, and forest products grown or cut on non-farm places are excluded. Thus the values listed herein do not reflect the total value of forest production, but only the farm forest production.

The value of farm forest products sold in the area was $94,315. This is a 36 percent decrease from the value of farm forest products in 1964. (Table 5).

TABLE 1: Number of Farms and Average Size of Farms, Long Island Sound Region With Comparisons 1959, 1964, and 1969.

	Number of Farms			Average Size of Farms		
	1959	1964	1969	1959	1964	1969
				acres		
Fairfield	374	408	347	85.	83.	65.
Middlesex	659	427	256	87.	95.	92.
New Haven	1,072	798	496	68.	72.	92.
New London	1,359	913	702	117.	132.	135.
4 County Total	3,464	2,546	1,801	93.	99.	104.
Connecticut Total	8,292	6,068	4,490	106.	118.	120.
Nassau	232	187	83	31.	29.	29.
Suffolk	1,258	1,138	743	71.	65.	82.
Westchester	303	231	133	83.	80.	114.
3 County Total	1,793	1,556	959	68.	63.	82.
New York Total	82,356	66,510	51,909	163.	184.	195.
LISS Total	5,257	4,102	2,760	85.	85.	96.
4 County Total/State Total	41.8%	42.%	40.1%	87.2%	83.9%	86.3%
3 County Total/State Total	2.17%	2.33%	1.84%	41.8%	34.3%	42.1%

Source: U. S. Census of Agriculture, 1959, 1964 and 1969.

TABLE 2 : Average Value of Land and Buildings per Farm and Per Acre, Long Island Sound Study with Comparisons 1959, 1964 and 1969.

Areas	Average Value per Farm			Average Value per Acre		
	1959	1964	1969	1959	1964	1969
	- - - - dollars - - - - - -			- - - - - - dollars - - - - -		
Fairfield	65,999	92,938	133,139	1035.	1275.	2028.
Middlesex	47,446	88,002	100,720	591.	820.	1094.
New Haven	47,437	76,180	149,895	814.	986.	1622.
New London	31,917	46,609	72,644	274.	343.	535.
4 County Total	45,784	70,244	109,566	492.	704.	1053.
Connecticut Total	47,372	67,429	111,071	444.	560.	921.
Nassau	115,907	324,005	213,211	8570.	6850.	7261.
Suffolk	95,149	128,345	290,850	1444.	1867.	3512.
Westchester	139,823	186,563	214,234	1923.	2003.	1878.
3 County Total	105,384	160,502	273,505	1973.	2174.	3314.
New York Total	23,936	32,797	53,399	146.	176.	273.
LISS Total	64,511	104,481	166,529	926.	1106.	1724.
4 County Total/State Total	96.6%	104.2%	98.6%	110.8%	125.7%	114.3%
3 County Total/State Total	440.3%	489.4%	512.2%	1,350.6%	1,229.0%	1,213.6%

Source: U. S. Census of Agriculture, 1959, 1964 and 1969.

Table 3 : Agricultural Establishments, Receipts and Payrolls, Long Island Sound Study Counties, 1969

Areas	Number of Establishments	Gross receipts for agricultural services	Total Gross Receipts	Annual payroll for Agric.Ser.	Total Annual payroll
		million dollars			
Fairfield	219	10.0	10.5	3.5	3.7
Middlesex	29	1.4	1.4	0.4	0.4
New Haven	90	4.3	4.6	1.3	1.3
New London	34	1.4	1.5	0.4	0.4
4 County Total	372	17.2	18.1	5.6	5.9
Connecticut Total	576	25.9	27.0	8.7	8.9
Nassau	474	26.1	26.5	9.3	9.4
Suffolk	198	13.0	13.3	4.4	4.4
Westchester	349	16.1	16.5	5.1	5.2
3 County Total	1,021	55.2	56.3	18.8	19.0
New York Total	2,182	123.6	126.5	41.0	41.4
LISS Total	1,393	72.4	74.4	24.5	24.8
4 County Total/State Total	64.6%	62.2%	66.8%	65.1%	65.6%
3 County Total/State Total	46.79%	44.68%	44.52%	45.82%	46.24%

Source: U. S. Census of Agriculture, Table 26, 1969, Vol. III, Agricultural Services.

TABLE 4 : Total Value and Average Value Per Farm of All Agricultural Production, Long Island Sound Region, with Comparison 1959, 1964 & 1969.

Areas	Total Value			Average/Farm		
	1959	1964	1969	1959	1964	1969
	- - - - million dollars - - - - -			- - - - - - - - dollars - - - - - - -		
Fairfield	4.8	5.6	5.8	13,877	13,611	16,799
Middlesex	9.5	8.7	9.5	14,611	20,278	37,258
New Haven	12.7	13.7	12.5	11,936	17,165	25,161
New London	15.8	18.3	21.0	11,049	20,009	29,971
4 County Total	42.7	46.2	48.9	12,337 1/	18,154 1/	27,115 1/
Connecticut Total	120.2	139.0	145.9	14,568	22,907	32,492
Nassau	6.2	6.8	5.0	27,072	36,618	60,779
Suffolk	39.2	48.7	50.3	32,119	42,806	67,665
Westchester	4.7	5.0	4.7	15,502	21,471	35,423
3 County Total	50.1	60.5	60.0	27,917 1/	38,895 1/	62,598 1/
New York Total	755.4	852.6	979.0	9,172	12,820	18,859
LISS Total	92.8	106.7	108.9	17,651	26,022	39,463
4 County Total/State Total	35.5%	33.3%	33.5%	84.7%	79.3%	83.5%
3 County Total/State Total	6.62%	7.09%	6.13%	304.37%	303.39%	331.92%

Source: U. S. Census of Agriculture, 1959, 1964 and 1969.

1/ Weighted average value per farm

Table 5 : Value of Crops, Livestock, Poultry and their Products and Forest Products, Long Island Sound Region

Areas	Value of Crops (inc.nursery and hay)		Value of Livestock Poultry and Products		Value of Forest Products	
	1964	1969	1964	1969	1964	1969
	million dollars					
Fairfield	2.4	2.6	3.1	3.2	0.06	0.02
Middlesex	4.3	5.2	4.4	4.4	0.01	0.005
New Haven	5.2	6.4	8.5	6.1	0.04	0.03
New London	1.4	2.4	16.7	18.6	0.03	0.04
4 County Total	13.3	16.5	32.6	32.3	0.1	0.09
Connecticut Total	53.7	59.5	84.8	86.2	0.3	0.2
Nassau	6.7	4.8	0.1	0.2	---	0.0008
Suffolk	36.5	34.9	12.0	15.4	0.01	0.002
Westchester	3.3	3.2	1.6	1.5	0.004	0.005
3 County Total	46.5	42.9	13.8	17.1	0.02	0.008
New York Total	242.3	244.7	601.9	731.0	6.1	3.3
LISS Total	59.9	59.4	46.4	49.4	0.2	0.1
4 County Total/State Total	24.73%	27.79%	38.48%	37.43%	48.48%	39.73%
3 County Total/State Total	19.20%	17.52%	2.28%	2.34%	.29%	.23%

Source: U. S. Census of Agriculture, 1964 and 1969.

APPENDIX B

CURRENT ANNUAL UPLAND EROSION AND SEDIMENT LOSSES

Subregion 1

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	8,927	2.75	24,549
Needing Treatment	18,307	8.89	162,749
Other Agricultural & Federal			
Orchards	673	1.70	1,144
Openland formerly cropped	336	.49	164
Pasture	12,462	1.10	13,704
Woodland	220,123	0.10	22,012
Other land	36,886	1.40	51,640
Federal land	0		0
Urban & Other Land			
Urban	31,861	0.86	27,400
Construction Sites	885	25.00	22,125
Roadbanks	1,169	12.27	14,342
Streambanks	48	28.20	1,353
Non-Sediment			
Contributing Areas	2,340		0
Total	334,017	1.02	341,182
Sediment (tons)	-	-	25,589
Value of Losses ($1,000)			
From Erosion			1,631
From Sediment			64
TOTAL			1,695

Subregion 2

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Lo (tons)
EROSION:			
Cropland			
Adequately Treated	813	2.97	2,41
Needing Treatment	5,705	12.14	69,25
Other Agricultural & Federal			
Orchards	263	.22	5
Openland formerly cropped	0		
Pasture	1,914	0.15	28
Woodland	76,159	0.06	4,56
Other land	17,226	2.70	46,51
Federal land	0		
Urban & Other Land			
Urban	9,674	0.86	8,31
Construction Sites	1,392	31.00	43,15
Roadbanks	215	4.34	93
Streambanks	33	218.00	7,19
Non-Sediment			
Contributing Areas	646	-	-
Total	114,040	1.60	182,693
Sediment (tons)			13,702
Value of Losses ($1,000)			
From Erosion			543
From Sediment			34
TOTAL			577

APPENDIX B

CURRENT ANNUAL UPLAND EROSION AND SEDIMENT LOSSES

(Cont'd)

Subregion 3

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	3,631	2.83	10,275
Needing Treatment	13,808	10.99	151,749
Other Agricultural & Federal			
Orchards	1,437	0.31	445
Openland formerly cropped	-		
Pasture	5,068	0.25	1,267
Woodland	127,111	0.07	8,897
Other land	25,352	1.40	35,492
Federal land	-		-
Urban & Other Land			
Urban	60,125	0.86	51,707
Construction Sites	1,293	37.80	48,875
Roadbanks	3,953	6.06	23,955
Streambanks	44	222.00	9,768
Non-Sediment			
Contributing Areas	1,087	-	-
Total	242,909	1.41	342,430
Sediment (tons)			25,682
Value of Losses ($1,000)			
From Erosion			1,993
From Sediment			64
TOTAL			2,057

Subregion 4

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	2,591	2.81	7,280
Needing Treatment	3,244	12.63	40,971
Other Agricultural & Federal			
Orchards	68	0.25	17
Openland formerly cropped	-		-
Pasture	3,918	0.36	1,410
Woodland	69,665	0.07	4,876
Other land	18,160	0.39	7,082
Federal land	-		-
Urban & Other Land			
Urban	25,937	0.86	22,305
Construction Sites	69	25.00	1,725
Roadbanks	1,889	1.47	2,769
Streambanks	19	440.00	8,360
Non-Sediment			
Contributing Areas	1,404	-	-
Total	126,964	0.76	96,795
Sediment (tons)			7,260
Value of Losses ($1,000)			
From Erosion			1,000
From Sediment			18
TOTAL			1,018

APPENDIX B

CURRENT ANNUAL UPLAND EROSION AND SEDIMENT LOSSES

(Cont'd)

Subregion 5

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	2,775	2.81	7,797
Needing Treatment	3,473	12.63	43,863
Other Agricultural & Federal			
Orchards	73	0.25	18
Openland formerly cropped	-		-
Pasture	4,191	0.36	1,508
Woodland	74,558	0.07	5,219
Other land	19,337	0.39	7,541
Federal land	-		-
Urban & Other Land			
Urban	28,225	0.86	24,273
Construction Sites	74	25.00	1,850
Roadbanks	2,534	1.17	2,965
Streambanks	20	409.00	8,180
Non-Sediment Contributing Areas	1,502	-	-
Total	136,762	0.76	103,214
Sediment (tons)			7,741
Value of Losses ($1,000)			
From Erosion			1,202
From Sediment			19
TOTAL			1,221

Subregion 6

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	-	-	-
Needing Treatment	186	22.40	4,166
Other Agricultural & Federal			
Orchards	162	21.52	3,486
Openland formerly cropped	46	.55	25
Pasture	-	-	-
Woodland	5,851	4.22	24,691
Other land	17,381	6.10	106,024
Federal land	-		-
Urban & Other Land			
Urban	65,701	2.20	144,542
Construction Sites	250	6.69	1,672
Roadbanks	-	-	-
Streambanks	-	-	-
Non-Sediment Contributing Areas	13,524	-	-
Total	103,101	2.76	284,606
Sediment (tons)			21,345
Value of Losses ($1,000)			
From Erosion			1,423
From Sediment			54
TOTAL			1,477

APPENDIX B

CURRENT ANNUAL UPLAND EROSION AND SEDIMENT LOSSES

Subregions 7, 8, & 9 (Cont'd)

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	2,745	2.48	6,808
Needing Treatment	2,941	6.10	17,940
Other Agricultural & Federal			
Orchards	583	8.48	4,944
Openland formerly cropped	1,005	0.86	864
Pasture	550	2.10	1,155
Woodland	20,127	0.86	17,309
Other land	8,590	2.65	22,764
Federal land	1,170	0.16	187
Urban & Other Land			
Urban	34,501	1.13	38,986
Construction Sites	1,877	36.00	67,572
Roadbanks	1,367	2.67	3,644
Streambanks	-	-	-
Non-Sediment			
Contributing Areas	6,393	-	-
Total	81,849	2.23	182,173
Sediment (tons)			13,663
Value of Losses ($1,000)			
From Erosion			1,002
From Sediment			34
TOTAL			1,036

Total for Subregions 1-9

SOURCE	Acres	Soil Loss (T/AC/Y)	Total Soil Loss (tons)
EROSION:			
Cropland			
Adequately Treated	21,482	2.75	59,123
Needing Treatment	47,664	10.30	490,696
Other Agricultural & Federal			
Orchards	3,259	3.10	10,112
Openland formerly cropped	1,387	0.76	1.053
Pasture	28,103	0.69	19,331
Woodland	593,594	0.15	87,573
Other land	142,932	1.94	277,053
Federal land	1,170	0.16	187
Urban & Other Land			
Urban	256,024	1.24	317,532
Construction Sites	5,840	32.02	186,971
Roadbanks	11,127	4.37	48,609
Streambanks	164	212,52	34,853
Non-Sediment			
Contributing Areas	26,896	-	-
Total	1,139,642	1.35	1,533,093
Sediment (tons)			114,982
Value of Losses ($1,000)			
From Erosion			8,796
From Sediment			287
TOTAL			9,083

APPENDIX C

DEFINITIONS OF LAND CAPABILITY CLASSES

The soil survey map shows the different kinds of soils that are significant and their location in relation to other features of the landscape. The information on the soil map must be explained in a way that has meaning to the user. These explanations are called interpretations.

The capability classification is one of these interpretations that is made primarily for agricultural purposes. The following are brief definitions of the eight capability classes.

Land Suited for Cultivation and Other Uses

Class I. Soils in Class I have few limitations that restrict their use.

Soils in this class are suited to a wide range of plants and may be used safely for cultivated crops, pasture, range, woodland, and wildlife. The soils are nearly level, and erosion hazard (wind or water) is low. They are deep, generally well drained, and easily worked. They hold water well and are either fairly well supplied with plant nutrients or highly responsive to inputs of fertilizer. The soils in Class I are not subject to damaging overflow. They are productive and well suited for intensive cropping.

Class II. Soils in Class II have some limitations that reduce the choice of plants or require moderate conservation practices.

Soils in this class require soil management, including conservation practices, to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and the practices are easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover.

Limitations of soils in Class II may include singly or in combination the effects of (1) gentle slopes; (2) moderate susceptibility to wind or water erosion, or moderate adverse effects of past erosion; (3) less than ideal soil depth; (4) somewhat unfavorable soil structure and workability; (5) slight to moderate salinity or alkali, easily corrected but likely to recur; (6) occasional damaging overflow; (7)

wetness correctable by drainage but existing permanently as a moderate limitation; and (8) slight climatic limitations on soil use and management.

Class III. Soils in Class III have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Soils in Class III have more restrictions than those in Class II and when used for cultivated crops the conservation practices are usually more difficult to apply and to maintain. They may be used for cultivated crops, pasture, woodland, range or wildlife food and cover.

Limitations of soils in Class III restrict the amount of clean cultivation, timing of planting, tillage, and harvesting, choice of crops, or a combination of these items. The limitations may result from the effects of one or more of the following: (1) moderately steep slopes; (2) high susceptibility to water or wind erosion or severe adverse effects of past erosion; (3) frequent overflow accompanied by some crop damage; (4) very slow permeability of the subsoil; (5) wetness or some continuing waterlogging after drainage; (6) shallow depths to bedrock, hardpan, fragipan, or claypan that limits the rooting zone and the water storage; (7) low moisture holding capacity; (8) low fertility not easily corrected.

Class IV. Soils in Class IV have very severe limitations that restrict the choice of plants, require very careful management, or both.

The restrictions in use for these soils are greater than those in Class III and the choice of plants is more limited. When these soils are cultivated more careful management is required and conservation practices are more difficult to apply and maintain. Soils in Class IV may be used for crops, pasture, woodland, range or wildlife food and cover.

Soils in Class IV may be well suited to only two or three of the common crops or the amount of harvest produced may be low in relation to inputs over a long period of time. Use for cultivated crops is limited as a result of the effects of one or more permanent features such as (1) steep slopes; (2) severe susceptibility to water or wind erosion; (3) severe effects of past erosion; (4) shallow soils; (5) low moisture-holding capacity; (6) frequent overflows accompanied

by severe crop damage; (7) excessive wetness with continuing hazard of waterlogging after drainage.

Land Limited in Use - Generally Not Suited for Cultivation

Class V. Soils in Class V have little or no erosion hazard, but have other limitations that are impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Soils in this class have limitations that restrict the kinds of plants that can be grown and that prevent normal tillage of cultivated crops. They are nearly level but some are wet, are frequently overflowed by streams, are stony, have climatic limitations, or have some combination of these limitations. Examples of Class V are (1) soils of the bottomlands subject to frequent overflow that prevents the normal production of cultivated crops; (2) nearly level soils with a growing season that prevents the normal production of cultivated crops; (3) level or nearly level stony or rocky soils; and (4) ponded areas where drainage for cultivated crops is not feasible but where soils are suitable for grasses or trees. Because of these limitations, cultivation of the common crops is not feasible but pastures can be improved and benefits from proper management can be expected.

Class VI. Soils in Class VI have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Physical conditions of soils placed in Class VI are such that it is practical to apply range or pasture improvements, if needed, such as seeding, liming, fertilizing, and water control with contour furrows, drainage, ditches, diversions, or water spreaders. Soils in Class VI have continuing limitations that cannot be corrected such as (1) steep slopes; (2) severe erosion hazard; (3) effects of past erosion; (4) stoniness; (5) shallow rooting zone; (6) excessive wetness or overflow; (7) low-moisture capacity.

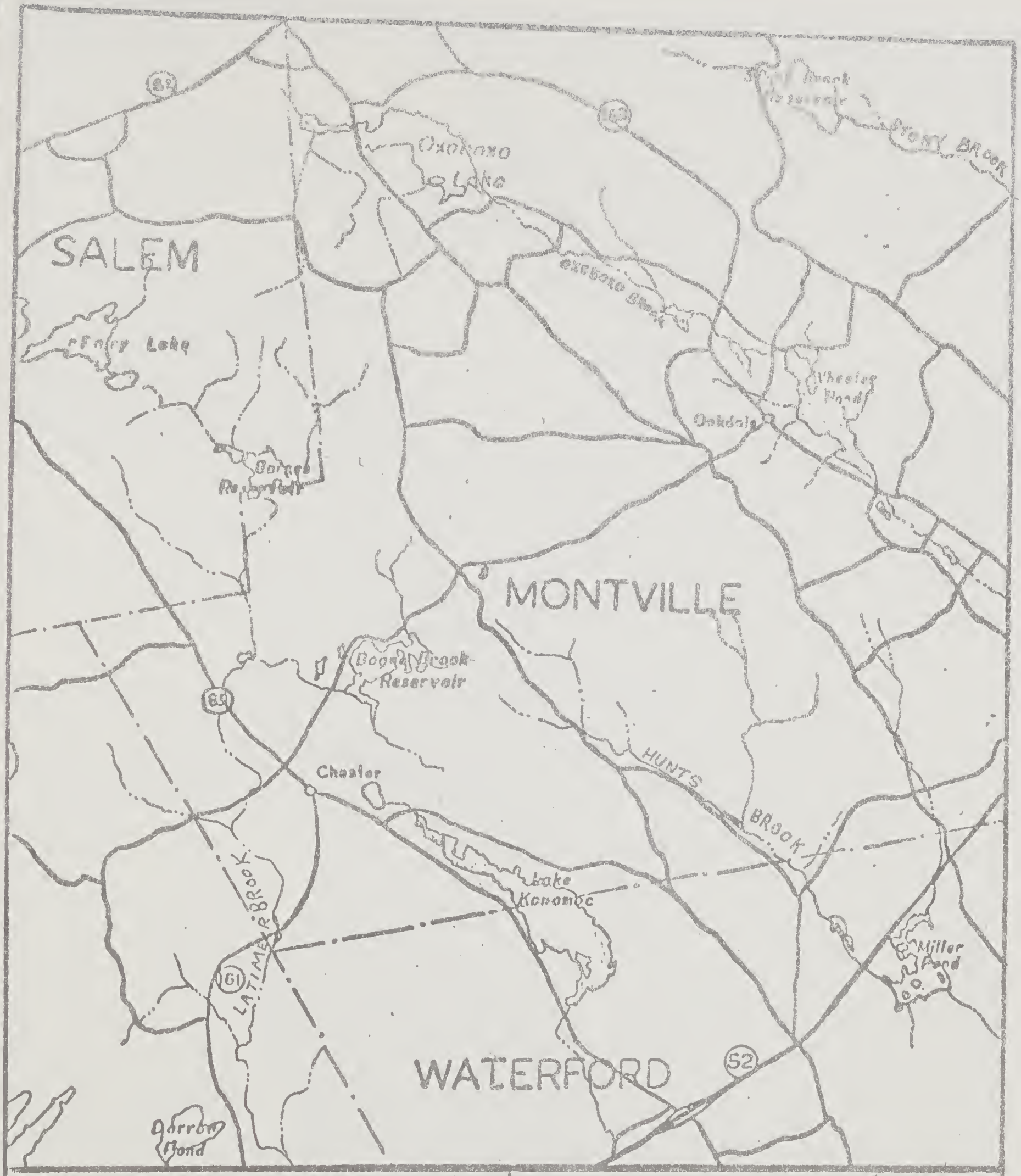
Class VII. Soils in Class VII have very severe limitations that make them unsuited for cultivation and that restrict their use largely to grazing, woodland or wildlife.

Physical conditions of soils in Class VII are such that it is impractical to apply such pasture or range improvements as seeding, liming, fertilizing, and water-control measures such as contour furrows, ditches, diversions, or water spreaders. Soil restrictions are more severe than those in Class VI because of one or more continuing limitations that cannot be corrected, such as very steep slopes, erosion, shallow soils, stones, and wet soils.

Class VIII. Soils and land forms in Class VIII have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or aesthetic purposes.

Soils and land forms in Class VIII cannot be expected to return significant on-site benefits from management for crops, grasses, or trees, although benefits from wildlife use, watershed protection, or recreation may be possible.

Limitations that cannot be corrected may result from the effects of one or more of the following: (1) erosion or erosion hazard; (2) severe climate, (3) wet soil; (4) stones; and (5) low moisture capacity.



LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" = 1 mile April, 1974

Figure 1

LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" - 1 mile April, 1974

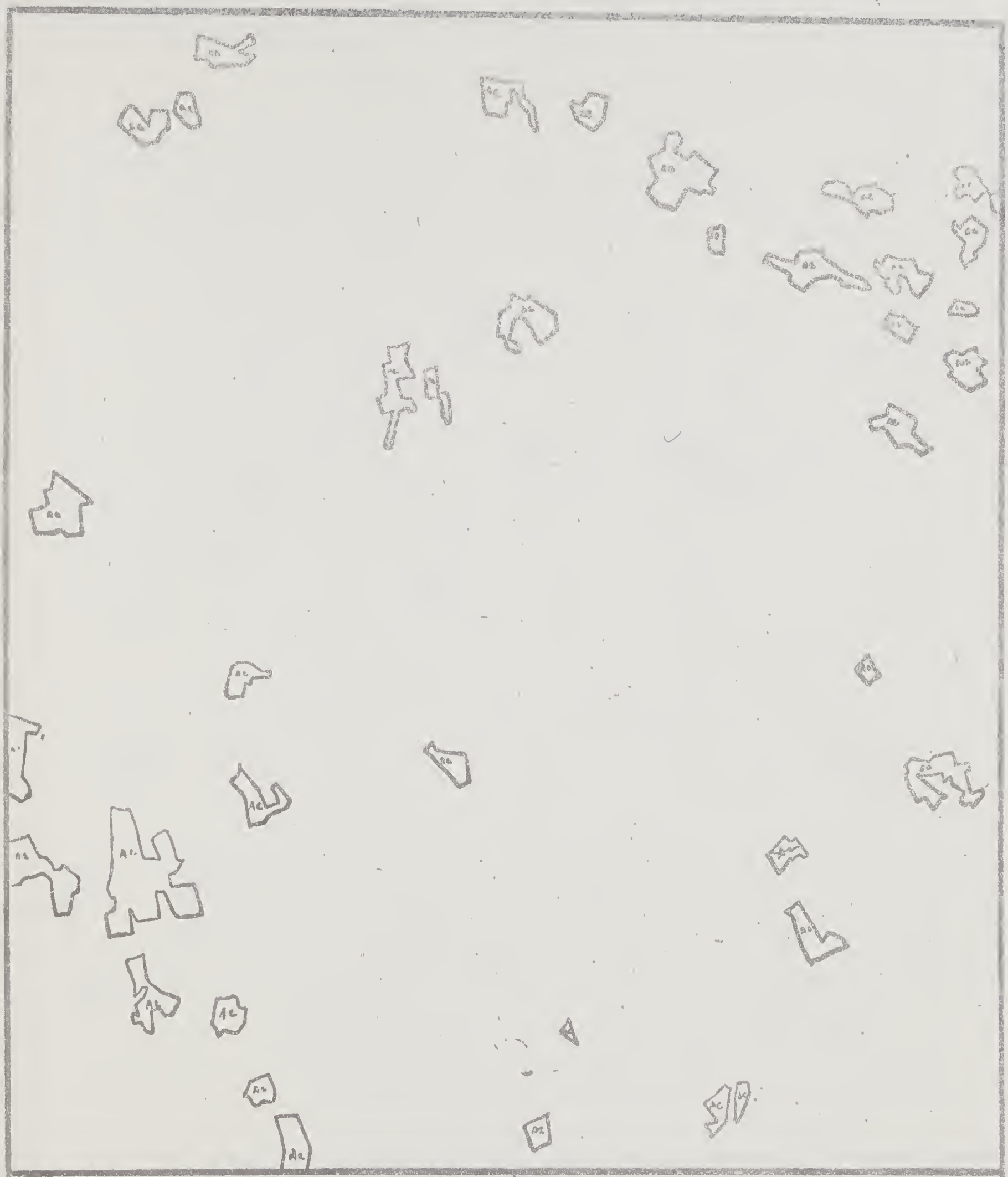
SLOPE

0-8%

8-25%

25% and over

Figure 2



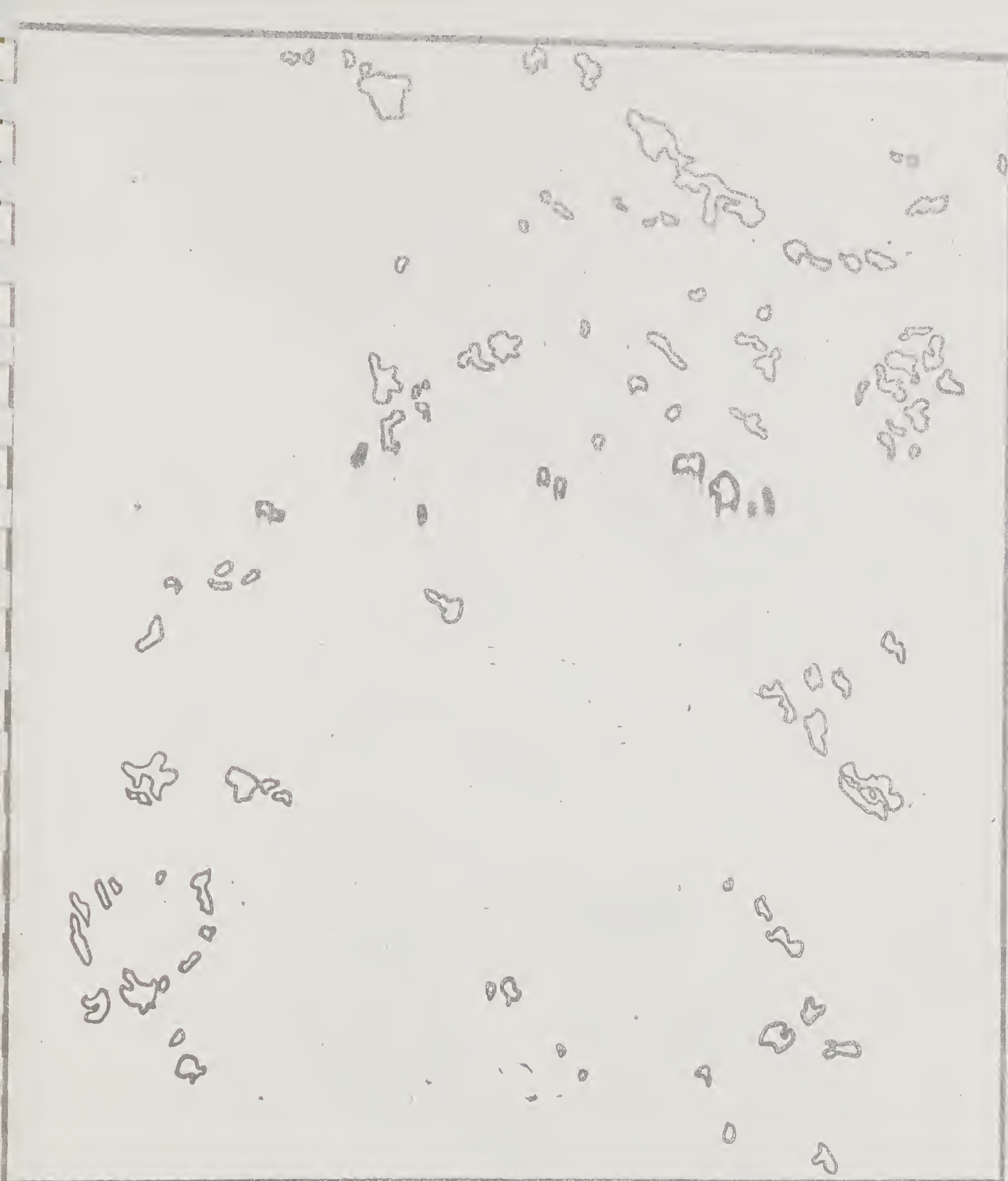
LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture
Scale: 1" = 1 mile April, 1974

ACTIVE AGRICULTURE

Ac

Figure 3



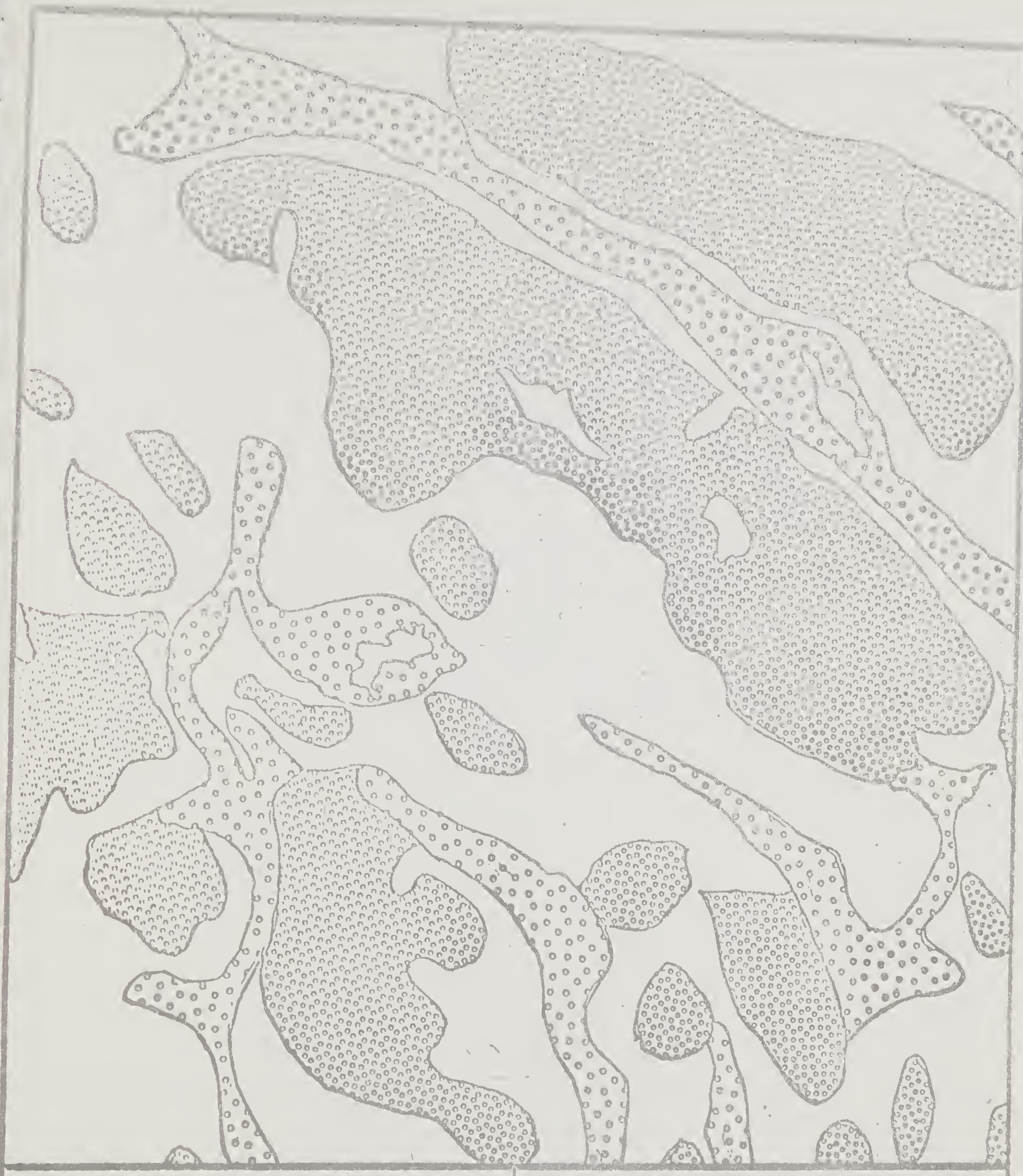
LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" = 1 mile April, 1974

PRIME AGRICULTURE LAND-DETAIL SOILS

Figure 4



LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

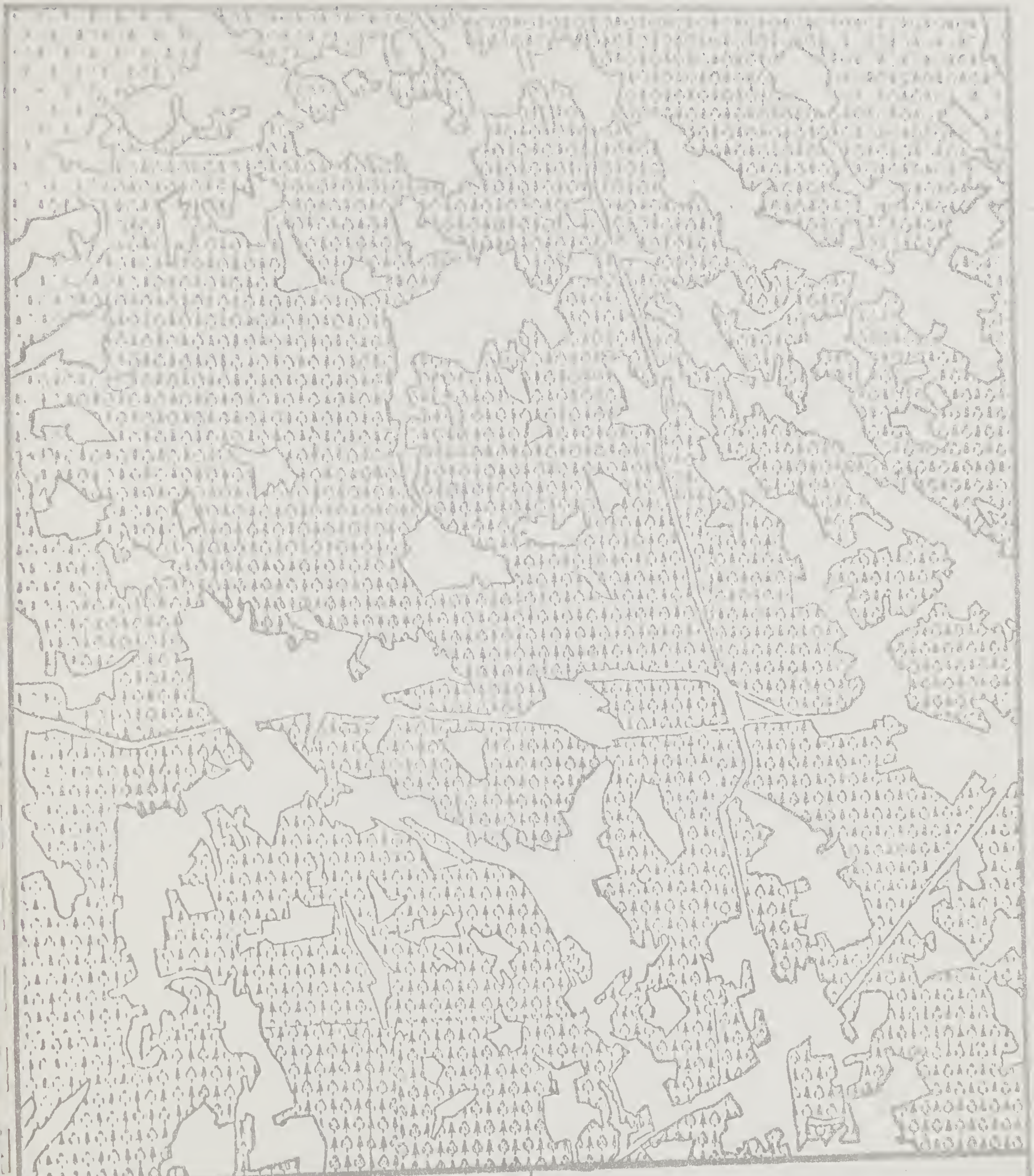
Scale: 1". = 1 mile · April, 1974

PRIME AGRICULTURE LAND-GENERAL SOILS

25% of

50% of

Figure 5



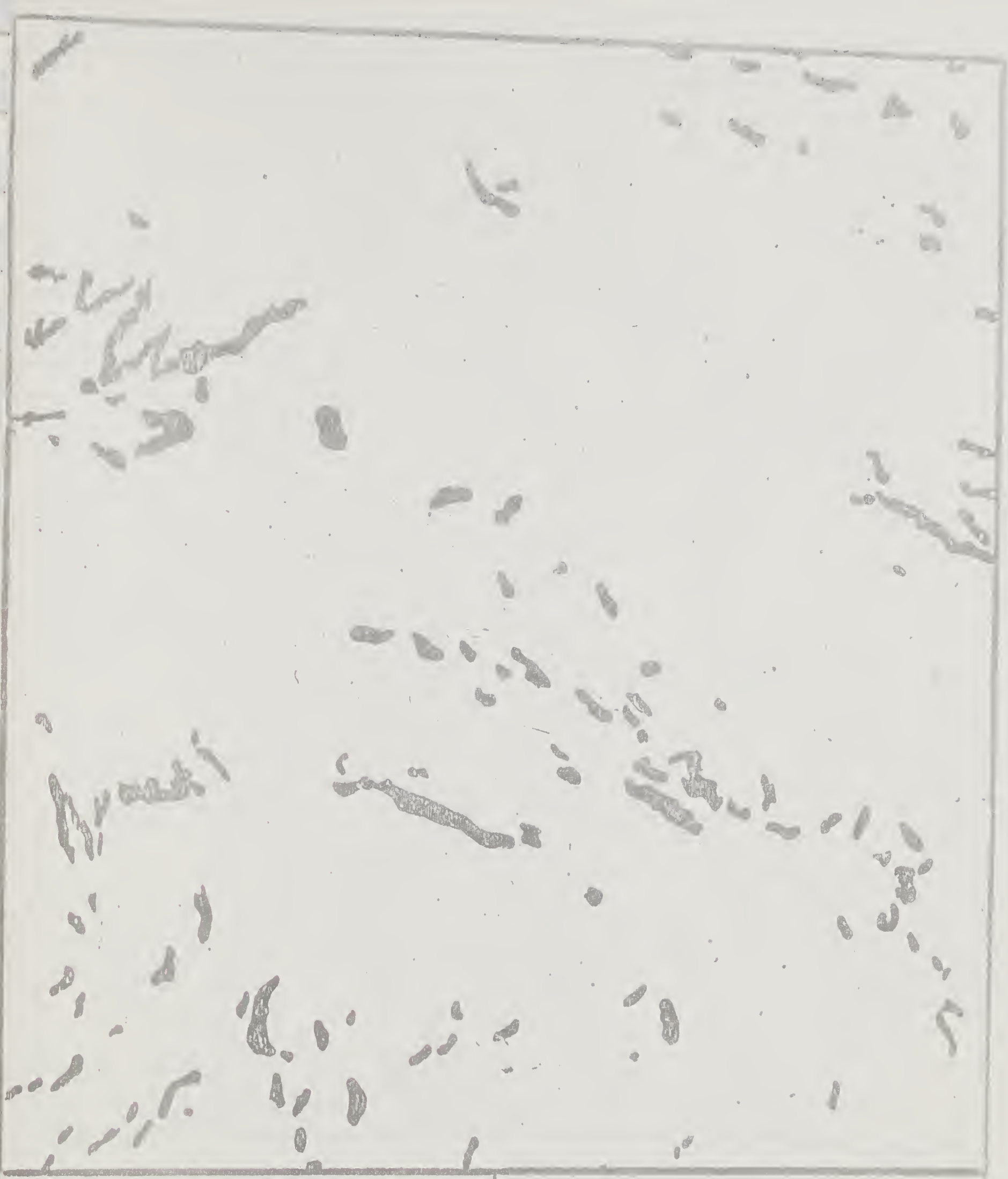
LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" = 1 mile

FOREST LANDS

Figure 6



LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" = 1 mile April, 1974

FOREST LANDS - 25% and over

LONG ISLAND SOUND STUDY

Base Map - Montville Quad
Source: U.S.G.S. Topo Quad
Prepared by:
U.S. Department of Agriculture

Scale: 1" - 1 mile April, 1974

◎ Potential Deep Water Site
◉ Existing Deep Water Site
△ Potential Shallow Water Site
▲ Existing Shallow Water Site
STREAMBELT

Figure 8